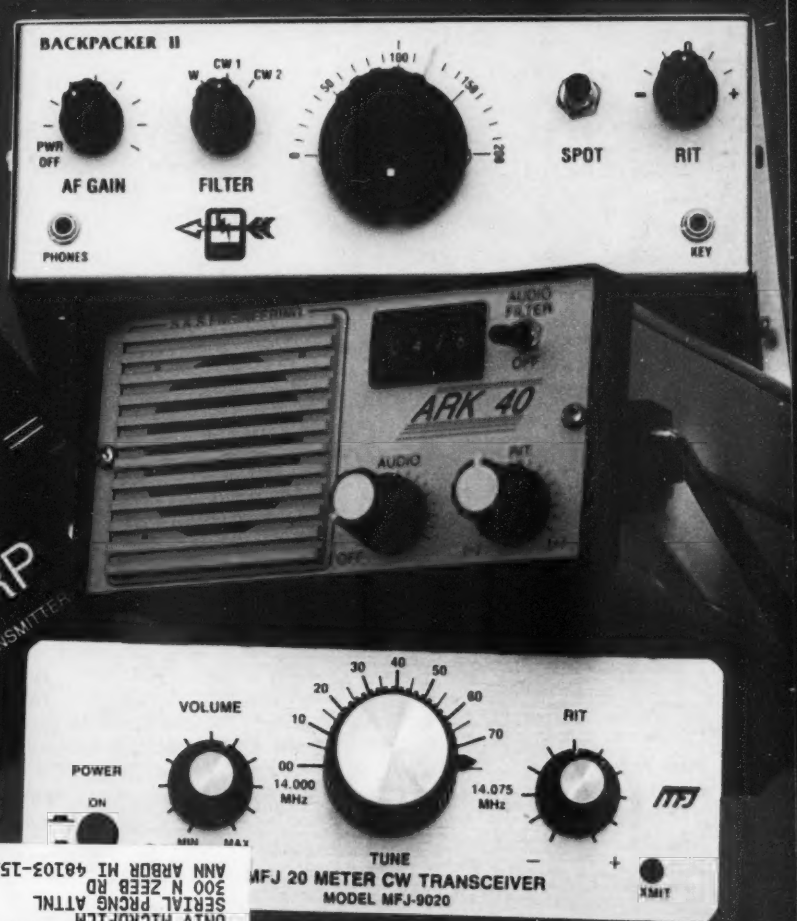
73 Amateur Radio Today

QRP

Low-Power Fun!

Gadgets For Your MFJ-9020

73 Reviews Two Great QRP Rigs



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ICOM

IC-765 HF Transceiver

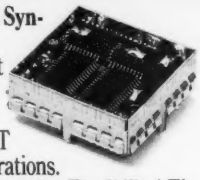
SPECIAL OFFER! LIMITED TIME ONLY!
FREE with your purchase of an IC-765 you will receive a CR282 High Stability Crystal AND either a FL53A 250 Hz CW Narrow Filter or a SM20 Desk Microphone

MAKE YOUR DREAMS A REALITY!

ICOM incorporated your most requested features with modern technology's best designs to produce the remarkable IC-765 dream rig. Its combination of excellent performance and superb reliability truly open a new dimension in HF operating enjoyment.

THE HF FOR TODAY'S ACTIVE AMATEUR.

Includes: ***Band Stacking Registers.** Each band's VFO's retain the last selected frequency, mode and filter choice when changing bands. Produces the equivalent of 20 VFO's; two per band. Great for multiband DX'ing! ***99 Fully Tunable Memories.** Store frequency, mode and filter selections. Each one can be returned and/or reprogrammed independent of VFO operations. Memories 90-99 also store split Tx/Rx frequencies. ***10Hz Readout.** Perfect on-the-dot frequency selection for nets, DX skeds and data communication modes. ***Full QSK Break-in.** For super CW operations!



***Direct Digital Synthesizer (DDS).** Assures ultra-fast PLL switching and lock-in for excellent PACKET and AMTOR operations.

***Maximum Operation Flexibility!** The three step attenuator cuts multi-station overloads. ***Built-in AC Supply.** The IC-765 is 100 percent duty cycle rated for cool operation and superb performance on all modes! ***Fully Automatic Antenna Tuner.** With built-in CPU and memory for extremely fast tuning and one-touch operation. Wide tuning range. ***CW Pitch Control.** Total operating comfort and convenience for successful contesting and DX'ing. An iambic keyer with adjustable speed and weight is also built into the IC-765! ICOM also included ***Narrow 500Hz CW Filters.** The FL-32A and FL-52A deliver razor sharp selectivity. A serious DX'ers delight! 250Hz FL-53A and FL-101 optional.

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CIRCLE 179 ON READER SERVICE CARD

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FREQUENCY COUNTERS

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now, for the first time, available on inexpensive, portable counters with our new ***ATH™*** Series. This feature is the most significant improvement ever made to the pocket sized counters! It allows "Hands Free" operation to automatically *read & hold* a signal as quick as 80 ms or 8% of a second.

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The ***ONE-SHOT ATH™*** feature is standard on the ***ATH-30***. Using controls and indicators on top of the unit, it will hold the first reading until manually reset. (The *ONE-SHOT* feature is a $40 option on the *ATH-15*.)

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***ATH™* Series features include:**

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- Ultra fast response time - 800% faster
- Extra bright LED digits
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- Maximized sensitivity, <1mv typical
- 4 GHZ signal strength Bar Graph
- 2 ranges - 6 fast gate times
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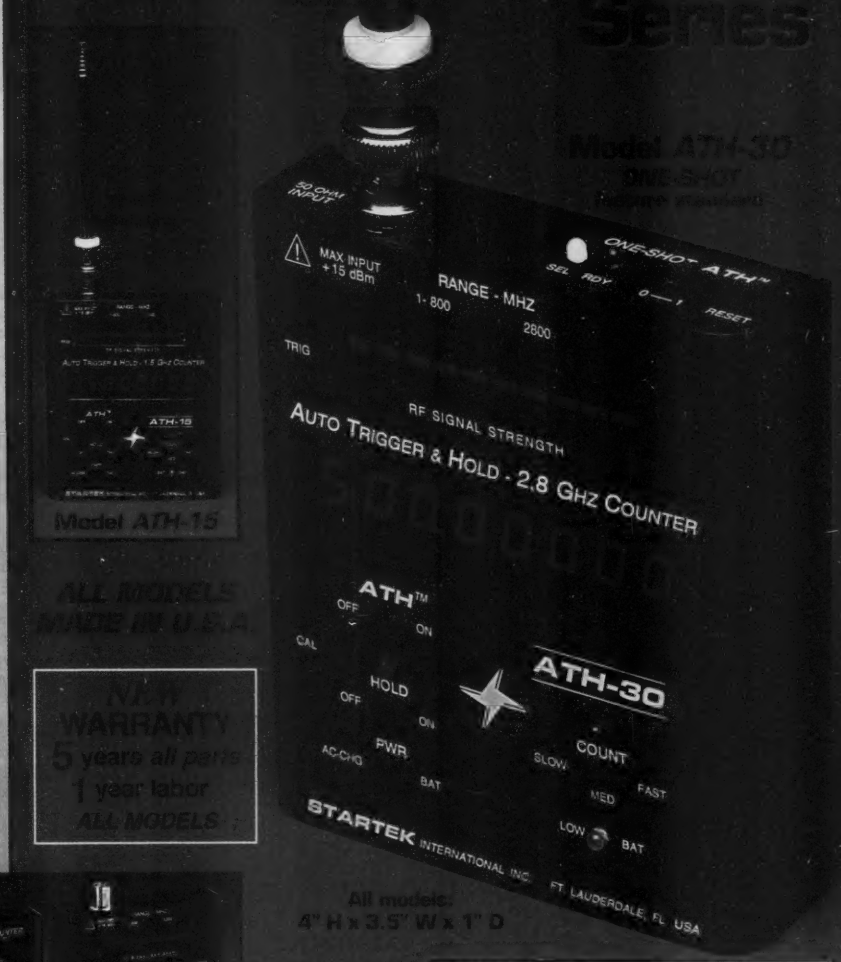
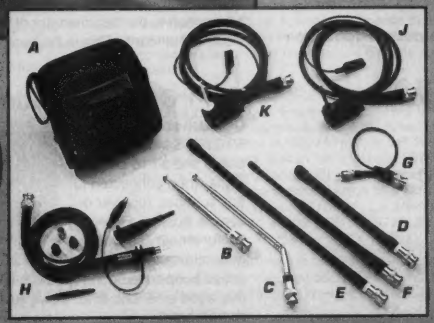
- ***StarCab™*** aluminum cabinet



ALL FREQUENCY COUNTERS PRICED WITH NI-CADs & AC ADAPTOR



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ATH-30	1-2800 MHZ, *ATH, ONE-SHOT*	259 ~~295.~~
HST-15	HIGH STAB TCXO fact. inst. option, 0.2 PPM accuracy	100 ~~125.~~

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D ***RD-150***	150 MHZ rubber duck	16.
E ***RD-2750***	27-50 MHZ rubber duck	28.
F ***RD-800***	800 MHZ rubber duck	29.
G ***M-207-IC***	Interface cable for MFJ-207	10.
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J ***LP-22***	Lo-Pass, audio usage probe	25.
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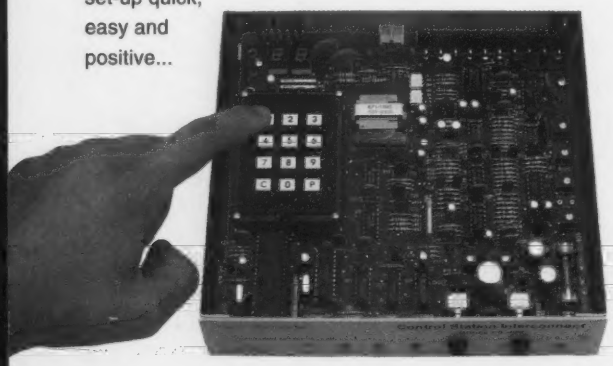
CIRCLE 247 ON READER SERVICE CARD

TURN your RADIO into a PHONE

Our microprocessor controlled interconnects patch your FM base station radio to your phone line and allow you to initiate and receive phone calls in your mobile or HT without assistance.

Only **CSI** interconnects offer important user friendly features such as Memory Speed-dialing, Last Number Redial and a built-in Programming keyboard with companion digital display which makes user set-up quick, easy and positive...



All features are fully user programmable: • Speed-dial memories • Single or multi-digit access code. • Secret toll override access code • Toll restrict numbers and sequences • Regenerated tone or pulse dialout • Ringout on 1-9 ring • Line in use detect • Call waiting • CW ID • Hookflash • Activity & Timeout timers... And More !

CSI has been the leading producer of interconnect products for over eleven years. All products are made in the U.S. A. and come with a one year limited warranty.

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Private Patch V

Private Patch V is a multi-mode interconnect that offers four user selectable modes: 1. Enhanced Sampling 2. VOX Simplex 3. Semi-Duplex 4.Repeater Maker. A 90 memory speed-dialer and remote base mode are also included. Can be connected to the Mic and speaker jacks of any simplex transceiver when used in VOX simplex. Fully FCC and DOC approved. No other patch offers as many modes and features.

CS-900 Control Station Interconnect

The CS-900 is VOX activated and can be used simplex or through any remotely located repeater. The standard 1/2 Second Electronic Voice Delay totally eliminates syllable or word clipping and results in unsurpassed simplex performance. A 90 memory speed-dialer and Remote base mode are also included. The only required connections are to the Mic and Speaker jacks of your simplex transceiver. Fully FCC and DOC approved. This is the best deal going in a simplex patch!

CS-800 Full Duplex Interconnect

The CS-800 will operate Full or Semi duplex and also has a built-in Repeater Maker. The only required connections are to the Mic and Speaker jacks of your dual band transceiver. A 9 memory Speed-dialer is standard. Fully FCC and DOC approved. This is your best choice in a Full Duplex Interconnect with built-in Repeater Controller!

CS-700 Intelligent Interconnect

The CS-700 is for simplex operation and offers selectable VOX Enhanced or VOX Controlled Sampling. Sampling allows the mobile operator to have positive control at all times. The CS-700 requires an internal connection to the discriminator of your simplex transceiver. A 9 memory Speed dialer is standard. This is the best sampling patch in the business!

CD-1 Communications Decoder Unit

Decodes and displays all 50 CTCSS tones, 104 DCS codes and all 16 DTMF digits when connected to any scanner, receiver or service monitor. Extremely useful for service work or determining the correct codes to operate open repeaters and autopatches. DTMF sequences are displayed a second time, slowly just in case the real time digits were too fast to comprehend.

CIRCLE 12 ON READER SERVICE CARD

73 Amateur Radio Today

October 1993
Issue #397

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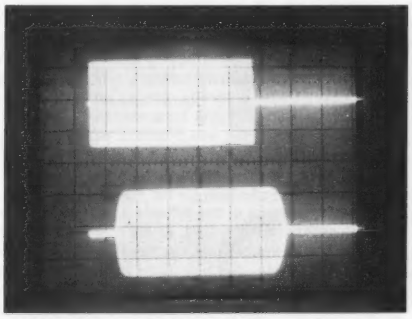

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FEEDBACK... FEEDBACK!

It's like being there—right here in our offices! How? Just take advantage of our FEEDBACK card on page 17. You'll notice a feedback number at the beginning of each article and column. We'd like you to rate what you read so that we can print what types of things you like best. And then we will draw one Feedback card each month for a free subscription to *73*.

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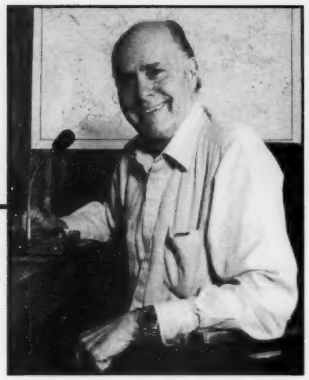
Contract: Congratulations! You have just been drafted by Uncle Wayne and the Team. Your first assignment is to contribute a clear, concise, and complete manuscript for publication. Drop us a line and we'll gladly send you a "How to Write for *73*" package. Now get out there and enjoy your hobby. Dismissed.

NEVER SAY DIE

Wayne Green W2NSD/1



Have You Seen *Radio Fun* Yet?

Well, I know the answer. No, you haven't. Because if you had you'd be a subscriber.

I started *Radio Fun* as a way to help the new no-coders get more fun out of amateur radio, and to encourage them to go for their General and Advanced tickets. I wanted them to find out how much fun we're having with packet, slow-scan, fast-scan, our ham satellites, radio clubs, DXing, certificate hunting, building kits, foxhunting, RTTY, emergency nets, and so on. I wanted them to know that amateur radio has a lot more to it than listening to old retired men talk about their illnesses over the local repeaters. Or, as in the case of our Ham-O'-The-Year award winner at Dayton this year, driving everyone within repeater range nuts extolling my virtues and my Horatio Alger success story.

So, how's *Fun* doing? Pretty well.

We've been sending it to every new licensee for about five or six months for free. Why for free? Well, I noticed that *QST* was having surprisingly little luck in getting new hams to subscribe. My idea was to get them really involved in their new hobby while it was new and they were still excited about it. But how many readers could we convert to paying subscribers? That was the key question. You can't give things away free forever.

Thirty years ago, before our mail boxes were as stuffed with junk mail, it was possible to send out a subscription offer for a magazine and get 10-12% of the people to subscribe. These days a 2% response is considered outstanding, with 1% being in the "good" range in the business. With today's postage rates we have to figure at least 60¢ per letter sent out. That's $600 per thousand. At $13 for a year's subscription and a 2% response we'd get 20 subscribers and $260 back for every $600 we spent. We didn't go that route.

Instead, I decided to let the publication do the selling instead of letters. It costs around $5 to send five issues, so the question was, what percentage of the readers would pay to subscribe after getting the five issues? That's about the same cost as sending eight letters. And eight letters might, at best, bring in a 16% response. So, have we been doing better than a 16% sale with the free sample route? You bet we have!

Out of 1,027 expired free subs in January, only three didn't renew! That's right, we got a 99.7% renewal! Nothing like that has ever happened in the publishing business before, so I expect we'll be getting excited write-ups in the publishing magazines. We should check and find out why the three didn't renew. Did they lose interest in amateur radio? Maybe they died?

Radio Fun obviously is terribly addictive. You tried it yet? The subscription price is a ridiculously low $12.97, though if it gets much thicker we'll have to raise it just to cover the postage. You can give it a try by sending a check for $12.97, or credit card info, for 12 issues to *Radio Fun*, 70 Route 202 N, Peterborough NH 03458-1107. You can even call 800-257-2346 or fax us at 603-924-9327.

The *Fun* advertisers are delighted. It turns out that my research was right . . . that our newcomers are the biggest spenders in the hobby by a wide margin. They're buying tons of VHF rigs, low-band transceivers, HTs, packet TNCs, antennas, and so on. Wow, are they buying antennas! Indeed, without this new bunch of big spenders, the ham industry would be suffering far more seriously from the recession. Fortunately for our *Fun* advertisers, much of the industry is still stuck advertising in *QST*, so the competition for this bonanza has been low.

$12.97 may not buy much these days, but it'll get you 12 months of *Fun*.

A Bigger, Fatter *73*?

If you'd like to see more pages of construction articles and equipment reviews in *73*, that's easy. No, my editorials won't get longer; the additional pages will be used for more articles. Like back in the late 1970s and early 1980s.

How can we do that? The formula is simple: For every extra page of advertising we're able to sell you'll get an additional page of articles. So how can we attract more advertising? Your complaining to the advertisers might help a little, but probably not much. They advertise in the magazines claiming the highest circulation. So, if we have 65,000 paid readers and *QST* has 130,000, that's where most of the ads are going to go.

How come *QST* has double our circulation? And what, if anything, can be done about it? Well, *73* was doing fine until I had to sell it 10 years ago.

I'd started a bunch of computer magazines back when the microcomputer industry was just getting started. Eventually the megapublishers with deep pockets came along and offered me a choice of selling my magazines to them or going out of business.

I got the best offer I could for my entire publishing company. That left me with no way to publish *73*, so that went along with the computer magazines and I had to start all over again to build a new publishing business. It took a while before I had a big enough organization to be able to take back *73*. By that time the computer publisher had come close to killing it. The circulation was down to half, and so was the advertising. There were an awful lot of disgusted ex-readers and angry ex-advertisers. And once you make customers mad they are incredibly difficult to ever get back, so we've been kind of limping along at half strength ever since.

I made a deal to publish *73* on contract, as a way to save it. I put my editorials back in and increased the construction projects and equipment reviews. Then, last year, I swapped *CD Review* for *73* and finally got back the ownership. Now I'd sure like to get it growing again and make it the biggest magazine in the ham field . . . the way it used to be.

If every subscriber would get just one other ham to subscribe, we'd really raise hell with *QST*. Once we have even close to their readership we'll get plenty of advertising and be fatter than they are. All it takes is circulation. Many advertisers aren't happy with *QST*, but it's got the largest circulation.

Subscriptions to *73* are $20 a year, so if you can get at least one other ham to send us $20 for a subscription, I'll have one whale of a magazine for you. One without all that baloney club news which fills so much of *QST*.

We are, by the way, the only ham magazine which has Audit Bureau of Circulation certified circulation numbers. The others we have to trust that they're not . . . er . . . being generous in their circulation estimates. But then, they wouldn't lie, would they? Not just to get more advertising dollars from gullible advertisers. It would never even occur to me to accuse my esteemed publishing colleagues of such villainous perfidy.

By the way, while it's a no-no for me to go on the air and solicit *73* subscriptions, there's nothing to prevent you from bringing up the subject when you run out of more important things to talk about . . . if there are any. It sure beats those old tired weather reports and cliché recitals of your equipment and antenna model numbers. If enough readers keep mentioning the magazine, it'll gradually begin to seep into even a few of the denser consciousnesses.

Your reward for all this? Firstly, I can assure you that you will be richly rewarded in heaven. I have connections. Secondly, you'll start having more magazine to read. A lot more. And the more stuff we have, the more fun you'll have reading it. We might even get your juices going and get you off dead center and into satellite communications or something.

That Lap of Luxury Deal

There's this myth about Wayne living in luxury on the enormous profits from *73*. Har-de-har. Oh, I can't complain . . . but that's because other ventures have done well. Ask anyone who knows me and you'll find that NSD stands for never spend a dollar. I'm cheap. And whenever I do manage to end up with some money I quickly invest it in a new venture, thus getting rid of it.

I think I mentioned that Sherry and I spent a week in Rome in April this year. When you're rich you can travel, right? Well, it turns out that the more you can get your business to charge things on a Continental Airlines Master Card, the more free trips you can take. Our week in Rome, complete, cost $551. Fine hotel, great meals, sightseeing everything, the works. You don't have to be rich, just smart.

Sherry has had three extravagant things she's wanted us to do. Her how-to-dance videos have been doing well, so she's arranged for us to fly to London on the Concorde, spend a week, and come back on the QE2. Maybe next year we'll do the Orient Express.

We'll be leaving Dec. 9th, in case your wife has some extra money stashed away and you'd like to join us. We get back the 19th. There's a special combo price, so it's a way to get in two big events in one trip. Your wife won't forget it. Heck, neither will you. I did a Concorde trip 10 years ago and I still remember every minute of it. I'm still using the Concorde playing cards to play cribbage. And win. Nobody beats me at cribbage. Nobody.

If you're interested let me know and I'll have Sherry get you the details. It'll be even more fun if we've got some friends like you along.

Are You a Dreadful Bore?

I'm still getting endless letters complaining about how boring most ham contacts are. They're not talking about *you*, are they? When's the last time, when they were signing off, that someone told you how much fun they'd had talking with you? Will they give you a call the next time they hear you on the air? Do other chaps break in at the end of a contact to tell you they've been listening and enjoying it?

Continued on page 74

IOBILE ANTENNA
RODUCTS

COMET

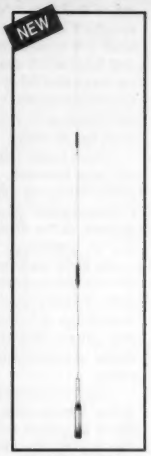
MODERN, MULTI-BAND ANTENNA SYSTEMS

Modern, high-performance stations use COMET Antennas, Duplexers, Triplexers and Accessories! COMET products are designed to provide an exceptional level of signal quality and coverage area. Whether operating mobile or from your base station, COMET products make you sound good. No other product line has the selection, convenience, quality and performance!

NEW

SB-5/SB-5NMO
Dual-Band 146/446MHz
Gain & Wave:
146MHz 3.0dBi 1/2 wave
446MHz 5.5dBi 5/8 wave x 2
VSWR: 1.5:1 or less
Max Power: 120W FM
Length: 38"
Connector: PL-259 or NMO style

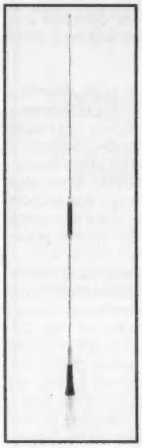
NEW



SB-7/SB-7NMO
Dual-Band 146/446MHz
Gain & Wave:
146MHz 4.5dBi 6/8 wave center load
446MHz 7.2dBi 5/8 wave x 3
VSWR: 1.5:1 or less
Max Power: 70W FM
Length: 4' 7"
Connector: PL-259 or NMO style

B-20/B-20NMO
Dual-Band 146/446 MHz
Gain & Wave:
146MHz 2.15dB 1/2 wave
446MHz 5.0dB 5/8 wave x 2
VSWR: Less than 1.5:1.
144-148MHz, 440-450MHz
Max Power: 50 watts
Length: 30"
Connector: PL-259 or NMO style
Construction: Black, w/fold-over w/Fold-Over

B-10/B-10NMO
Dual-Band 146/446 MHz
Gain & Wave:
146MHz –dB 1/4 wave
446MHz 2.15dB 1/2 wave
VSWR: Less than 1.5:1.
144-148MHz, 440-450MHz
Max Power: 50 watts
Length: 12"
Connector: PL-259 or NMO style
Construction: Black, cellular look-a-like w/Fold-Over



CX-224/ CX224NMO
Tri-Band 146/220/446MHz
Gain & Wave:
146MHz 2.15dB 1/2 wave
220MHz 3.6dB 5/8 wave
446MHz 6.0dB 5/8 wave x 2
VSWR: 1.5:1 or less
Max Power: 100 watts
Length: 3'
Connector:
CX-224 PL-259
CX-224NMO NMO Style

NEW

HA4S
Quad-Band HF Mobile
7, *14, 21, 24, 28MHz
Wave: 1/4 wave
VSWR: Less than 2:1
Weight: 1 lb. 14 ozs.
Length: 4' 4"
Connector: PL-259
Construction: Heavy Duty, w/Fold-Over
***L-14HS:** Optional 14MHz Coil

NEW

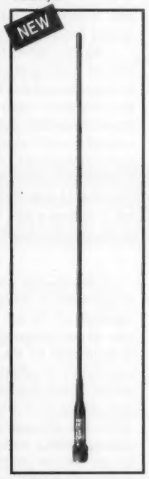
FJ-15S
Tri-Band Mobile
50/146/446MHz
Gain & Wave:
50MHz 2.15dBi 1/4 wave
146MHz 4.5dBi 5/8 wave center-loaded
446MHz 7.2dBi 5/8 wave x 3
VSWR: 1.5:1 or less
Max Power: 120 watts FM
Length: 4' 10"
Connector: PL-259

CHL-185
146MHz
Gain & Wave:
4.1dB 5/8 wave
VSWR: 1.5:1 or less
Max Power: 200 watts
Length: 4' 8"
Connector: PL-259

NEW

CH-722SA
146/446MHz HT Antenna
Gain & Wave:
146MHz 3.0dB 1/2 wave
446MHz 5.5dB 5/8 wave x 2
Max Power: 50 watts
Length: 36"
Weight: 3.9 ozs.
Connector: BNC

NEW

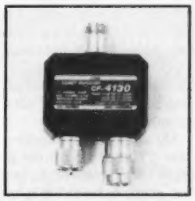


SH-55
146/446MHz HT Antenna
Gain & Wave:
146MHz 1.5dBi 1/4 wave
446MHz 3.2dBi 5/8 wave
Max Power: 10 watts
Length: 15.5"
Connector: BNC

CH-32
Miracle Baby 146/446MHz HT Antenna. Compact design, the smallest HT antenna available!
Gain & Wave: 0dB
VSWR: 1.5:1 or less
Max Power: 10 watts
Length: 1.75"
Connector: BNC

RS-21
Trunk, hatchback, rear door (van, blazer, etc.) mount. Adjustable to virtually ANY angle. Rubber-coated base protects vehicle paint.

RS-620
Heavy-duty low profile trunk lip or hatch back mount. Rubber coated base protects vehicle paint.



CF-4160K, CF-4160I, CF-4160J
146/446 MHz
Band Pass, Ins. Loss, Max Power:
1.3-150MHz, 0.1dB, 800w PEP
400-540MHz, 0.2dB, 500w PEP
Isolation: 60dB
CONNECTORS:

	CF-4160K	CF-4160I	CF-4160J
Output:	SO-239	SO-239	SO-239
Low In:	PL-259	PL-259	SO-239
High In:	PL-259	N-Male	SO-239

3D4M Standard Cable Assembly
13.5 feet of low loss coax. Gold plated UHF (PL-259/SO-239) connectors.

3D5M Standard Cable Assembly
Same as 3D4M, but 17 feet of coax.

CK-5M Deluxe Cable Assembly
13 feet double shielded very low loss coax. + 12" RG-188 teflon coax. Gold-plated UHF (PL-259/SO-239) connectors. Allows easy entry from a lip-mount w/o causing coax or weather strip damage.

CK-5M5 Deluxe Cable Assembly
Same as CK-5M, but 17 feet of coax.

CROSS NEEDLE METERS

- Separate Meter and RF Sensor allows for convenient placement of the meter.
- Cross Needle Meter provides FWD, REF, and VSWR simultaneously.
- The RF-Sensor is a compact design, and has an extremely low-loss circuit.
- Beautifully illuminated when connected to power supply.
- 6 foot cable standard.
- Optional "EKS-3" 10 foot extension cable for a total of 16 feet between the sensor and meter.

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CIRCLE 54 ON READER SERVICE CARD

LETTERS

Number 2 on your Feedback card

From the Hamshack

Keith Bruno KC4ZVV, Orlando FL Wayne—Your last issue of *73* inspired me to finally take some time out of my schedule and write. Let me first state that you have a fine magazine and it is the best amateur radio publication in existence, hands down. I have read them all, but have only kept up my subscription to yours.

I agree with almost all of your opinions, especially those relating to the farce called government. Most of your ideas for change are very logical. Unfortunately, that is precisely why the government will probably never listen to them.

You are always bashing the educational system of our "fine" country and I would like to further reinforce that opinion. I am a product of our poor educational system. I graduated from high school in 1983, nowhere near prepared for the *real* world. I can honestly state that I was bored with most of the subjects in high school, except for computer science. Luckily, I got a great job right after high school working for the world's largest defense contractor and had some great opportunities to pursue my first love, computers (my second being amateur radio).

I have to say, though, that if one wants an education, it is out there. Ninety-five percent of everything I have learned about computers, and ninety-nine percent of what I have learned about amateur radio I have learned on my own. Right now I am enrolled in the NRI course for Radio Electronics and hope to get my General Radio Telephone Operator's License. There is no one who is responsible for my education and my well-being except me. I hate it when people grumble about how they never had a chance, or that the world owes them a living. Baloney! Get out there and get yourself an education. Stop complaining about your life and do something about it.

My wife is always making fun of me. I am 27 years old now and always seem to get involved in what she calls "old men's hobbies." It is a shame, but at the club meetings I go to almost everyone is over 40, with most of the guys in their 50s. I may see one or two kids, but that's it.

And as for offering any help, forget it! No one, not even the local amateur radio shop, is even helpful. As a matter of fact, they all seem to have this attitude that if you don't already know, then they are not going to take the time to explain it. Pitiful!

I have taken your advice to try something new and have gotten into packet. Again, I had to dig through the manuals and call the manufacturer to figure out how to connect it to my computer and radio. I want to figure out how to link my two computers together with some software like PC Anywhere. I figure if they can do it over the phone, then I should be able to do it over the radio.

I have a no-code Technician license. I got it before they even had a formal no-code test, about two months after they came out with it. I do not plan to upgrade until the code requirement is dropped. I really have no desire to exchange callsigns, QTH, and a signal report with some old guys who have never done anything but pound on those brass keys. Heck, if I need CW to "punch through" in bad conditions, I'll hook up my multimode controller and type on the keyboard and let it send CW.

Adam Haile NØVCL/AE, Sterling OH Wayne—I am writing in response to your editorial in the May 1993 issue of *73*. You were right about schools. I am 14 years old and I am homeschooled. We are wrapping up our second year. I have enjoyed homeschool very much. These two years have gone by faster than any two years in public school.

For science (up until April of this year), I studied radio and electronics theory. I began studying for my Technician Class license in October 1992. On April 6, 1993, I upgraded to Extra Class. While getting school credit, I did something I enjoyed doing. I could not have done this in public school. Now I have gotten my dad interested in ham radio and he is studying for his Technician license.

Also, I agree with your editorials on EMR. Keep up the good work. Your ideas are very good, and they get better as more research is done on this subject.

Bruce Williams N9JCV, Lake Villa IL Six months ago I purchased an ICOM 728. I love it. I had a problem with it (the preamp went out). I sent it back to ICOM for warranty repair and it was back in my shack two weeks after I sent it away.

Yes, I bought a kit also. I purchased a Ramsey 30m transceiver, spent three hours putting it together, and it works like a charm.

I used to work all SSB, 100 watts. I got my WAS, WAC and DXCC (applied for). I am now very interested in QRP operation and building. By the way, *73* does a great job supporting QRP endeavors. I think everyone should cut their power by 50%. What nicer bands we would have.

Wayne, I don't agree with everything you write, but I always read your column from front to back as soon as I get *73*.

Oh? What in hell don't you agree with? . . . Wayne

Bill Eaton N9OTZ, Elgin IL Wayne, along with so many other hams, I enjoy *73*. The deciding vote for *73* vs. *CQ* or any other publication is your editorials. It's so refreshing to hear intelligent, well-thought-out ideas and viewpoints. Of yet I've found no point of contention, although I suspect we may differ on religious ideas.

In January 1992, my partner (I'm a paramedic) was browsing through a handie-talkie sale pamphlet. "Neat looking scanner," I said. From that point on my understanding of ham radio as a bygone hobby of yesteryear, consisting of an oversized, tube-operated transceiver, a Morse code key and an antenna that made neighbors nervous, has changed. I was licensed in March and have loved the hobby. I've met many hams, all of whom have confirmed my pastor's comment of ham radio as "a gentleman's hobby." From these meetings I've seen everything from 20 meter DX to ATV balloons and ATV with the shuttle spacecraft! Needless to say, this keeps my motivation alive to upgrade and expand. The only thing that holds me back is time and money (not necessarily in that order).

Frustrations? Yes. The pathetic lack of any substantial, in-depth conversation. On my attempts to initiate such, the normal response is, "Oh, that's interesting . . . Well, what kind of radio are you using?" or "How's the weather?" Once in a while it works, though.

Here's a new thought on the service/hobby issue: Any hobby that requires initiative and learning, that may lead one to higher education, etc.—keeps kids off the street!—is a service. It may lead someone to your editorials and get them thinking. Now, that's service!

Now for my pocket review: the Yaesu FT-415 2 meter handie-talkie. After a year and a half of almost daily operation, the only problem I've encountered so far is that the click stops on the frequency dial quit clicking and stopping. My dial began to turn freely, scooting up and down frequencies with annoying speed. Being an excited newcomer to the hobby, I bypassed factory service and fixed it by slipping a small plastic tube over the dial post and replacing the knob. This makes for a nice snug dial which still functions well. I've always received good reports on audio quality. A fine feature of most handie-talkies is that your hand gets burned if you talk too long, keeping a check on the motor-mouth syndrome.

Fixing things yourself? What are you, some kind of troublemaker? . . . Wayne

Richard Monjure, Covington LA Wayne, I see comments about other hams in your column. There are all kinds of people in radio, and they talk about varied topics. Topics such as racial separatism, homosexuality, politics, etc., are offensive to some, but there is a bigger issue involved. That is "Freedom of Speech," which is in our *Bill of Rights* and in the *Communications Act of 1934*. So, as unpleasant as certain topics are, I would not shut up those who discuss them as long as they operate according to the radio regulations.

I make my living in radio. I know the limitations of CW, but *it is still possible to send a telegram via CW*, despite what some writers in ham radio magazines say. A large portion of the world's merchant ships still use CW. The reason many hams cannot accept this is that so very few hams really understand CW.

If you cannot copy 20 WPM you cannot expect to handle traffic efficiently on manual Morse circuits. The ability to receive code using a typewriter is also a requirement. You hear hams who say they copy "words, not letters." Come on! You cannot copy that way and expect to have the accuracy required for traffic handling.

The professional CW operator must have readable sending at a good speed. Automated keying is a must, unless you are good on the key. What do you hear on the ham bands? Operators who equate skill with speed. They send faster than they are able to legibly transmit and wind up having to correct nine out of every 10 words they transmit.

What is the point of all this CW talk? The vast majority of hams cannot work CW due to *lack of skill and understanding of that very mode.* Extras included. Any ham radio operator who wants to work CW should pass a real code test and have a CW endorsement on his license before he is allowed to operate on the CW bands. I believe CW is limited compared to modern data methods, but it has its place.

Which leads me to the question of no-code licenses. I do *not* feel code ability should be required for ham radio operators *not operating CW*. In my opinion, all the different license classes are not necessary.

An entry level amateur radio operator test should cover theory on the basics because everyone needs basic knowledge to build on. Past that, the test taken should depend on which mode of communication you plan on using.

Operators should understand the circuitry, bandwidths, etc. used in their mode of choice so they know how to use it properly on the air within the technical regulations set forth by the FCC. It is too bad the testing is not directly in the hands of the FCC anymore. I see no problem with a $35 license examination/renewal fee.

I think it is terrible that anyone can buy books with the exact questions and answers to the amateur exams in them. That should be stopped. Whatever rule has to be changed should be changed to end this *cheating*.

I do not think the UHF frequencies are so important to ham radio. Some should be available to experimenters, but the ham radio role as a back-up communications system I think is a natural for the HF range. Most commercial communications, except for Maritime Mobile, have abandoned HF in favor of satellite communications. Hams could be a natural to fill this "void." The new digital modes make this feasible.

Richard—I'm not aware that I have suggested a limitation on discussion subjects on the air. I am opposed to the use of bad language, even though that is protected by the Constitution. It isn't necessary to offend people. As far as religion and politics are concerned, I like Glasgow's quote: "The fewer the facts, the stronger the opinion." I enjoy talking politics and religion on or off the air, as long as I'm talking with a thinking person and not a zealot.

Fine on CW. But why bother testing the code when someone using it has to be able to copy to do it? That's self-testing.

The microwave ham bands probably won't be a problem for long. Satellite bands are going to be in such enormous demand that we'll lose 'em all fairly soon. Too bad. It would be fun to have a ham satellite system which would allow an unlimited number of us to communicate anywhere in the world 24 hours a day. With spread spectrum, this is possible. There's an outfit here in NH developing just such a system. It'll make it possible for any car, truck, boat, ship, etc., to be in constant communication anywhere with any fixed or mobile stations with voice or data. I doubt there'll be much more of a need for ham emergency services once this gets going. It's a kind of super cellular telephone. Cheers . . . Wayne 73

Low Cost GaAsFET PREAMPS

LNG-(*)

ONLY $59 wired&tested

FEATURES:

- **Very low noise:** 0.7dB vhf, 0.8dB uhf
- **High gain:** 13-20dB, depends on freq
- **Wide dynamic range** - resist overload
- **Stable:** low-feedback dual-gate FET

**Specify tuning range: 26-30, 46-56, 137-152, 152-172, 210-230, 400-470, 800-960 MHz.*

LNW-(*) MINIATURE PREAMP

ONLY $29 kit, $44 wired&tested

- GaAs FET Preamp similar to LNG, except designed for **low cost & small size.** Only 5/8"W x 1-5/8"L x 3/4"H. Easily mounts in many radios.

**Specify tuning range: 25-35, 35-55, 55-90, 90-120, 120-150, 150-200, 200-270, 400-500 MHz.*

LNS-(*) IN-LINE PREAMP

ONLY $89 kit, $119 wired&tested

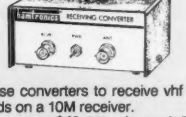
- GaAs FET Preamp with features similar to LNG series, except **automatically switches out of line during transmit.** Use with base or mobile transceivers up to 25W. Tower mounting brackets incl.

**Tuning range: 120-175, 200-240, or 400-500.*

HELICAL RESONATOR PREAMPS

- GaAs FET preamps with 3 or 4 section helical resonators **reduce intermod & cross-band interference** in critical applications. **MODEL HRG-(*), *$80 vhf, $110 uhf.*** **Specify tuning range: 142-150, 150-162, 162-174, 213-233, 420-470.*

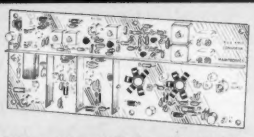
RECEIVING CONVERTERS



Low noise converters to receive vhf and uhf bands on a 10M receiver.

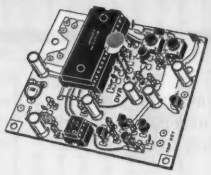
- **Kit less case *$49*, kit w/case & BNC jacks *$74*, w&t in case *$99*.**
- Input ranges avail: 50-52, 136-138, 144-146, 145-147, 146-148, 220-222, 222-224 MHz, 432-434, 435-437, 435.5-437.5, and 439.25 (to chan 3).

TRANSMITTING CONVERTERS



XV2 for vhf and XV4 for uhf. Models to convert 10M ssb, cw, fm, etc. to 2M, 220, 222, 432, 435, and atv. 1W output. ***Kit only $89.*** PA's up to 45W available.

ACCESSORIES



NEW DVR-1 DIGITAL VOICE RECORDER Module. Primarily a **voice ID'er for repeaters**. May also be used as a **contest CQ caller** or as a **"radio notepad"** to record up to 20 seconds of received transmissions for instant recall. As a **repeater ID'er,** it will record your voice, using either the built-in microphone or an external mic. It can be used with almost any repeater COR module. As a **contest caller,** you can record a message or even several messages and play them through your transmitter at the press of a switch. As a **radio notepad,** you can keep it wired to the audio output of a receiver ready to record up to 20 seconds of anything you might want to recall later. Play it back as many times as you like through a small external speaker. (Call for more information.) .....kit $89, w&t $139

TD-3 SUBAUDIBLE TONE DECODER/ENCODER. Adjustable for any tone. Designed **especially for repeaters,** with remote control activate/deactivate provisions ....kit $29, wired & tested $69

COR-3 REPEATER CONTROLLER. Features adjustable tail and time-out timers, solid-state relay, courtesy beep, and local speaker amplifier ..... kit $49

CWID. Diode programmed any time in the field, adjustable tone, speed, and timer, to go with COR-3 ..... kit $59

COR-4. Complete COR and CWID all on one board for easy construction. CMOS logic for low power consumption. Many new features. EPROM programmed; specify call ..... kit $99, w&t $159

TD-2 TOUCH-TONE DECODER/CONTROLLER. Full 16 digits, with toll-call restrictor, programmable. Can turn 5 functions on/off. Great for selective calling, too! .....kit $89, wired & tested $149

NEW TD-4 SELECTIVE CALLING Module. Economy touch-tone decoder with 1 latching output. Primarily designed to mute speaker until someone calls you by sending 4-digit tt signal but may also be used to turn on autopatch or other device..... kit $49, w&t $89

AP-3 AUTOPATCH. Use with above for repeater autopatch. Reverse patch and phone line remote control are std. .....kit $89, wired & tested $149

AP-2 SIMPLEX AUTOPATCH Timing Board. Use with above for simplex operation using a transceiver ..... kit $39

MO-202 FSK DATA MODULATOR. Run up to 1200 baud digital signals through any fm transmitter with full handshakes. Radio link computers, telemetry gear, etc. ..... kit $49, w&t $79

DE-202 FSK DEMODULATOR. For receive end of link. ..... kit $49, w&t $79

9600 BAUD DIGITAL RF LINKS. **Low-cost** packet networking system, consisting of MO-96 Modem and special versions of our 144, 220 or 450 MHz FM Transmitters and Receivers. Interface directly with most TNC's. Fast, diode-switched PA's output 15 or 50W.

NEW **Real-Speech Voice ID Option Available With DVR-1 Digital Voice Recorder Shown At Left!**

REP-200 REPEATER

A microprocessor-controlled repeater with autopatch and many versatile dtmf control features at less than you might pay for a bare-bones repeater or controller alone!

We don't skimp on rf modules, either! Check the features on R144 Receiver below, for instance: GaAs FET front-end, helical resonators, sharp crystal filters, hysteresis squelch.

Kit $1095; w&t only $1295!
Voice ID Option $189.

Other models available:

REP-200V Economy Repeater. As above, except uses COR-4 Controller without DTMF control or autopatch. **Kit only $795.**

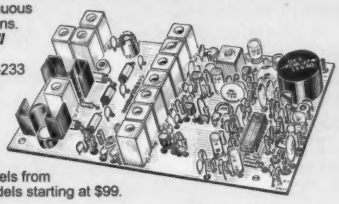
REP-200N Repeater with no controller. For use with external controller, such as those made by ACC. **Kit only $695, w&t $995.**

- Available for the 50-54, 143-174, 213-233, 420-475, 902-928 MHz bands.
- *FCC type accepted for commercial service (hi-band and uhf).*
- **Rugged exciter and PA**, designed for continuous duty.
- Power out 20W 50-54MHz; 15W (25W option avail.) 143-174MHz; 15W 213-233 MHz; 10W uhf; 10W 902-928MHz.
- Available add-on PA's **up to 100W.**
- **Six courtesy beep types**, including two pleasant multi-tone bursts.
- **Open or closed access autopatch, toll-call restrict**, auto-disconnect.
- **Reverse Autopatch,** two types: auto-answer or ring tone on the air.
- Pulse (rotary) dial option available.
- **DTMF CONTROL:** over 45 functions can be controlled by dtmf command. 4-digit control code for each function.
- **Owner can inhibit** autopatch or repeater, enable either open or closed access for repeater or autopatch, and enable toll calls, reverse patch, kerchunk filter, site alarm, aux rcvr, and other options.
- Cw speed and tone, beep delay, tail timer, and courtesy beep type **can be changed at any time** by owner password protected dtmf commands.
- **Auxiliary receiver input** for control or **cross linking repeaters.**
- Many **built-in diagnostic** and testing functions using microprocessor.
- Color coded **LED's indicate status** of all major functions.
- **Welded rf-tight partitions** for exciter, pa, receiver, and controller.
- 3½ inch aluminum rack panel, finished in eggshell white and black.

XMTRS & RCVRS FOR REPEATERS, AUDIO & DIGITAL LINKS, TELEMETRY, ETC.

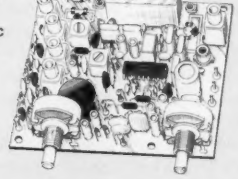
Also available in rf-tight enclosures, and with data modems.

FM EXCITERS: 2W continuous duty. TCXO & xtal oven options. ***FCC type accepted for com'l high band & uhf.***



- **TA51**: 50-54, 143-174, 213-233 MHz ...kit $109, w&t $189.
- **TA451**: 420-475 MHz ...kit $109, w&t $189.
- **TA901**: 902-928 MHz, (0.5W out); w&t $219.
- **VHF & UHF AMPLIFIERS.**
- For fm, ssb, atv. Output levels from 10W to 100W. Several models starting at $99.

FM RECEIVERS:



- **R144/R220 FM RECEIVERS** for 143-174 or 213-233 MHz. **GaAs FET** front end, 0.15uV sensitivity! Both crystal & ceramic if filters plus **helical resonator** front end for exceptional selectivity: >100dB at ±12kHz (best available anywhere!) Flutter-proof hysteresis squelch; afc tracks drift. ...kit $149, w&t $219.
- **R451 FM RCVR,** for 420-475 MHz. Similar to above. ...kit $149, w&t $219.
- **R901 FM RCVR,** for 902-928MHz. Triple-conversion, GaAs FET front end. ...$169, w&t $249.
- **R76 ECONOMY FM RCVR** for 28-30, 50-54, 73-76, 143-174, 213-233 MHz, w/o helical res or afc. ...Kits $129, w&t $219.
- **R137 WEATHER SATELLITE RCVR** for 137 MHz. Kit $129, w&t $219.

- **Buy at low, factory-direct net prices and save!**
- **For complete info, call or write for free catalog.**
  Send $2 for overseas air mail.
- **Order by mail, fax, or phone** (9-12 AM, 1-5 PM eastern time.)
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QRX . . .

FCC Relaxes Business Restrictions

The Federal Communications Commission has enacted a major change in the law restricting amateur radio use for personal business and public service. Under the new rules, it will no longer be a violation to order a pizza or make an appointment via amateur radio. The Commission has acted to amend the Part 97 Amateur Service rules allowing for more flexibility in personal business and public service communications.

The amendment permits licensees to use the amateur service frequencies to assist with public service communications at races, parades, and educational activities. Personal communications which will no longer be prohibited include making appointments, ordering food, and collecting data for the National Weather Service.

Effective 30 days after publishing in the Federal Register (approximately September 15th), here is what you can do (with some exceptions) on the ham bands:

Any amateur-to-amateur communications are now permitted unless:

a. Specifically prohibited. These include:

1. Music (except for incidental space shuttle music);
2. Communications facilitating a criminal act;
3. Messages obscured by codes or ciphers;
4. Obscene or indecent words or language; and
5. False or deceptive messages, signals, or identification.

b. Transmissions for compensation. The following exceptions apply:

1. Morse code practice and information bulletins (special criteria);
2. Classroom teachers using ham radio in the classroom.

c. Transmissions for the pecuniary benefit of the station control operator or his or her employer.

The following communications are permitted, but not on a ". . . regular basis" (not defined by the FCC):

1. Communications which could be reasonably furnished through other radio services;
2. Notices concerning sale or trade of amateur station apparatus; and
3. Retransmissions of government provided space shuttle, propagation, and weather forecast broadcasts.

Here are some examples of the old and new part 97.113 which covers prohibited communications:

OLD RULE: No amateur station shall transmit any communications which promotes the business or commercial affairs of any party. If anyone profits financially, it is an illegal transmission.

NEW RULE: An amateur may not be paid, direct or indirect, for his voluntarily provided communications.

OLD RULE: Except for emergency communications, the ham bands may not be used as an alternative to other authorized radio services.

NEW RULE: Amateur-to-amateur communications which could reasonably be furnished alternatively through other radio services will now be permitted on the ham bands—although not on a regular basis. This will allow amateurs to legally participate with the Weather Service, police and fire departments, parks and forestry service, and many other local, state, and federal agencies. *TNX Westlink Report, No. 654, July 29, 1993, and W5YI Report, Issue 16, August 15, 1993.*

Technician is Hot Ticket

The Technician Class amateur radio license is maintaining its accelerated growth rate of 20%—by far the fastest growing ham class. Before 1991, amateur radio overall grew at only a sluggish 3% rate. Today, that figure is a healthy 10%. If the rate of growth of amateur radio continues on the track it's on now, we will surpass one million licensed ham operators by 1998.

In 1985, only one amateur in five was a Technician. But since the arrival of the Codeless Technician Class in 1991, the demographics have shifted significantly. Today, one third of all hams are Techs. *TNX W5YI Report, Issue 13, July 1, 1993.*

2 Meter Transmitter for AMSAT Phase 3D

The AMSAT Phase 3D Satellite will don a snappy new 2 meter transmitter, designed and built by Mike Dosett G6GEJ. This task will be undertaken as part of AMSAT-UK's participation on the international project team. Mike described his proposed design at the recent AMSAT-UK Colloquium held at the University of Surrey in England.

Together with the 70cm uplink receiver being constructed in Germany, the AMSAT-UK-supplied 2 meter transmitter forms a mode UV station, (also known as Mode B on OSCAR). Current users of Mode B on OSCARs 10 and 13 can look forward to better performance with the launch of the new bird, slated for April 1996.

Calling All Home-Brewers

The Radio Amateurs of/du Canada are making a call for papers for the Technical Symposium of their First National Convention. Papers concerning both the technical and practical aspects of ham radio are welcome. Subject areas include: HF, VHF, and UHF communication methods and techniques, packet, AMTOR, RTTY, AMSAT, and EME.

The papers will be featured in a 30-45 minute presentation and a 15-minute Q & A session with the audience. They will also be printed in the Technical Proceedings of the First National Convention of R.A.C.

R.A.C. Convention '94 will take place in Calgary, Alberta, Canada, July 29-31, 1994. For further information please contact: *G.W. (Gerry) Shand VE6BLI, 55—51551 Range Road 212A, Sherwood Park, AB, T8B 1B2 Canada; (403) 922-2099, FAX (403) 438-4398.*

Clinton is High on Hams in Space

The president of the United States, no less, took time out of his busy schedule recently to extol the virtues of the Shuttle Amateur Radio EXperiment (SAREX) program. While talking to the STS-57 mission astronauts on a special hookup, President Bill Clinton said: "I understand that later in the mission Janice (Voss) and Brian (Duffy N5WQW) are going to be talking with schoolchildren around the world. I just want to tell you how much I appreciate the fact that you're making an international education project out of this mission. That's very important to me."

Astronaut Brian Duffy responded: "Mr. President, we find that using amateur radio is an excellent way of communicating with children all around the world, and we're also able to excite them by using space and science."

President Clinton concluded: "You may be on this mission, creating thousands of scientists for the future just by the power of your example and by this direct communication. I think sometimes we underestimate the impact that human contact in an enormously impressive setting like this can have on children across the world—not only those with whom you talk, but millions of others who will just see it and know that it happened." *TNX Westlink Report No. 653, July 15, 1993* and *W5YI Report, Issue 13, July 1, 1993.*

Alkaline Batteries Rise From the Dead

Look out NiCds (nicads)—technology has given new life to spent alkaline batteries. Until recently, alkalines were considered throw-away types. Now Rayovac Corporation has unveiled an improved alkaline cell and recharger combo that blends the advantages of alkalines with those of NiCds.

The low cost *Renewal* battery comes fully powered and ready to go. Rayovac says it lasts up to three times longer than a NiCd when new—however, the cycle-hours decrease to about the same as a NiCd after about 25 charges. The new battery also can hold a charge for five years (compared to three months with a NiCd) and shows no susceptibility to the dreaded memory effect of NiCds. *TNX Electronic Products, No. 3, August, 1993.*

INTRODUCING THE PK-900... NEW FROM THE INSIDE OUT!

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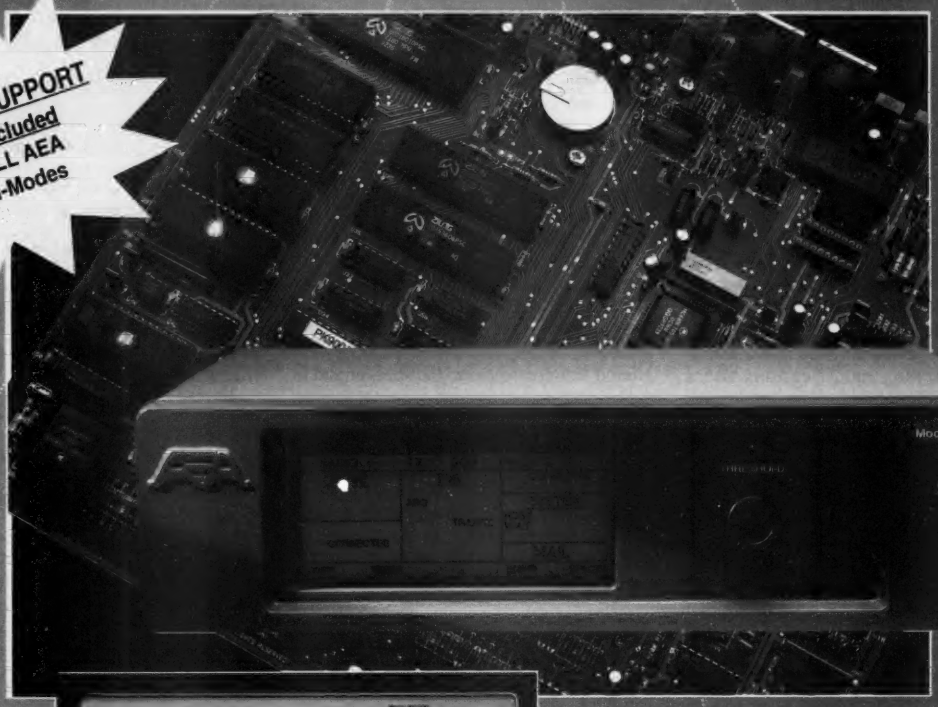

IT'S THE NEXT GENERATION IN MULTI-MODE CONTROLLERS.

Now, there's a new standard of excellence in multi-mode digital controllers...the new PK-900 from AEA. It incorporates all of the features which made the PK-232 the most popular multi-mode controller in the industry. But that's just the start. AEA's new PK-900 also features dual port HF or VHF on either port; low cost 9600 baud plug-in option; memory ARQ and VHF DCD state machine circuit; powerful triple processor system; zero crossing detector for the sharpest Gray Scale FAX you've ever seen; and many other new software selectable features.

Inside and out, the new PK-900 from AEA is what other multi-mode controllers will now be measured against

- Processors used: Zilog 64180, Motorola 68HC05C4, Motorola 68HC05B4
- Data rates: 45 to 1200 baud standard, up to 19.2K baud with external modems
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More Gadgets for Your MFJ-9020

Add features to this great QRP rig.

Robert W. Vreeland W6YBT

Like many hams, I just can't leave ham radio at home. The ideal traveling station should be lightweight and compact and should also have sufficient power for use with indoor antennas. The MFJ-9020 is the ideal basic building block for such a station. I have added an extra audio amplifier, some keying modifications and a lightweight power supply. For hotel room use, I built a short inductively-loaded dipole and a 20 watt amplifier to drive it.

Although the MFJ-9020 audio is quite adequate under normal conditions, some hams may want a little more volume. Therefore, I've added an LM380N amplifier using the circuit provided by the manufacturer (Figure 1). The LM380N has a gain of 50 but I wanted a gain of 10 so I added a five-to-one input divider consisting of a 22k resistor and a 4.7k resistor. The 0.02 µF capacitor rolls off the high frequencies to reduce noise.

Photo A shows the method of mounting the amplifier using the MFJ speaker mounting screws. The original mounting nuts were left in place to serve as spacers, providing adequate clearance between the circuit board and the cabinet. Note that the circuit board has been cut to fit the contour of the speaker. The strange tunnel on top of the LM380N is a sheet-copper heat radiator, grounded and soldered to pins 3,4,5,10,11 and 12. The white wire was disconnected from the speaker and reconnected to the amplifier input. The amplifier ground was connected to the speaker and to the original brown ground wire. Of course, I connected the amplifier output to the free speaker terminal. Power for the amplifier was taken from the two rear terminals on the MFJ power switch. The amplifier is used only with the loudspeaker. I have found that my old 2000 ohm Telex earpiece works much better than the earpieces designed for 8 ohm outputs.

The MFJ keying, although crisp and clean, was a little bit too solid for my taste so I decided to soften it, as shown in Photo B. This was done by bypassing to ground the output of the 78LO5 regulator (U8), using a 47 µF capacitor in parallel with a 220 ohm resistor. A 1N4005 protective diode was connected across the 78L05 as shown in Figure 2. This modification was done without drilling any holes and without removing the MFJ circuit board. The regulator (U8) is located at the left near the front of the circuit board. I very carefully soldered a piece of #26 hookup wire to the regulator output lead on the top side of the circuit board. (A voltmeter was used to locate the 5 volt output lead.) The other end of this wire was connected to a terminal strip which I mounted on the MFJ antenna connector using one of the existing mounting screws. The 47 µF capacitor and the 220 ohm resistor were then mounted on this terminal strip.

The manufacturer has thoughtfully provided a circuit board trace bringing the keyed 12 volt supply out just in front of the relay. The 1N4005 was connected between this point and the terminal strip. The keyed 12 volt bus was also brought out through a 100 ohm 1 watt resistor. This was connected to a red pin jack mounted in one of the unused holes on the rear panel. The jack is used to control my 20 watt amplifier for semi break-in.

The RF amplifier uses a pair of 600 volt Supertex VN0660N5s (Supertex Inc. 1225 Bordeau Dr., Sunnyvale CA 94088-3607). High-voltage MOSFETS are nice because they can be powered directly from the recti-

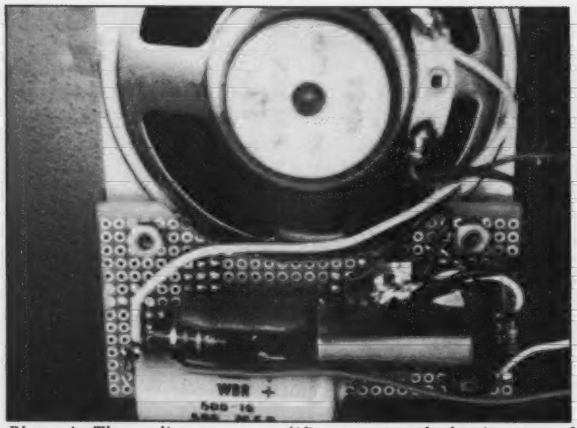

Photo A. The audio power amplifier was attached using two of the original loudspeaker mounting screws. Note the tunnel-shaped sheet-copper heat radiator at the lower right. It is soldered to the LM380N.

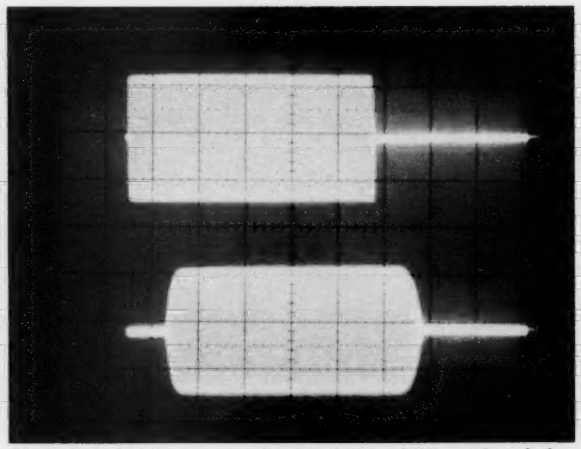

Photo B. A double exposure showing the keyed RF envelope before modification (above) and after (below). The horizontal time base is 5 milliseconds per division.

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See *free* MFJ catalog for complete line of MFJ SWR Analyzers™.

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MFJ-949E **$149.95** **World's** most popular antenna tuner covers 1.8-30 MHz, has lighted *peak*/average Cross- Needle SWR/ Wattmeter, 4:1 balun for balanced lines and *full size* 300 watt dummy load.

Versatile 8 position antenna switch lets you *pre-tune* MFJ-949E into dummy load to minimize QRM.

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Cabinet is chemically etched to MFJ's bond tough *baked-on* paint.

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MFJ-1270B **$119.95**

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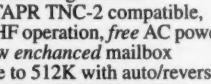
Fully TAPR TNC-2 compatible, VHF *and* HF operation, *free* AC power supply, new *enchanced* mailbox expandable to 512K with auto/reverse mail forwarding, WeFAX mode lets you print weather maps, optional plug-in 2400/9600 baud modems, KISS interface, MFJ Host mode.

MFJ TNC/Mic Switch

MFJ-1272B **$34.95**



MFJ TNC/Mic Switch lets you switch between your TNC or microphone by pushing a button!

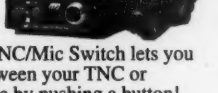
Just plug pre-wired cables into your rig's mic connector and TNC.

Plug-in jumpers let you use nearly any rig with 8 pin mic connector.

MFJ-1272B, $34.95 /MFJ/TAPR TNC2 clones; **MFJ-1272BX**/PK-232; **MFJ-1272BYV**/KAM VHF/KPC3; **MFJ-1272BYH**/KAM HF Port; **MFJ-1272BZ**/PK-88, $39.95 each.

Regenerative RCVR Kit

MFJ-8100K **$59.95**



Build this *regenerative* shortwave receiver *kit* and listen to shortwave signals from all over the world with just a 10 foot wire antenna.

Has RF stage, vernier reduction drive, smooth regeneration, five bands.

MFJ-8100W, $79.95, assembled.

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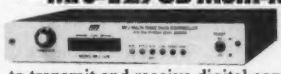

MFJ-1278B **$299.95** Use this MFJ-1278B, your transceiver and computer to transmit and receive digital communications! You'll discover a whole new world of ham radio and communicate in ways you never knew existed on our ham bands.

The *world class* MFJ-1278B Multi-Mode and MultiCom™ software is packed with features *no other* multi-mode gives you.

You get *10 digital modes* . . . Packet, AMTOR, PACTOR (at no extra cost), RTTY, ASCII, Navtex, Color SSTV, 16 Gray Level FAX, CW and Memory Keyer plus an *enchanced* 32K Mailbox.

You'll have fun joining worldwide *packet* networks and exchanging *color SSTV* pictures with your buddies around the world. You'll marvel at *full color FAX* news photos as they come to life on your screen. You'll see weather changes on highy detailed *weather maps* in all 16 gray levels. You'll eavesdrop on late breaking news as it happens on *RTTY*. You'll enjoy error free HF QSOs on *PACTOR* and *AMTOR* and receiving packet mail in an *enchanced 32K mailbox*. Want to copy some *CW*? Just watch your screen.

MFJ-1289, $59.95, MultiCom™ software and cables.

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6 bands: 40, 20, 15, 10, 6, 2 Meters . . . No radials or ground needed!

Operate 6 bands -- 40, 15, 10, 6 and 2 Meters --with this MFJ-1796 *ground independent* halfwave vertical antenna! No radials or ground ever needed!

MFJ-1796 **$199.95**

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Efficient *end loading*, no lossy traps. *Entire length* is always radiating. *Full size* halfwave on 2 and 6 Meters. High power *air-wound* choke balun eliminates feedline radiation. Adjusting one band has minimum effect on other bands. Add $20 s/h.

Easy to assemble -- you'll have it on the air in an afternoon.

MFJ's world famous 3 KW Versa Tuner V

MFJ-989C **$349.95**

Here's why the MFJ-989C is the finest 3 KW antenna tuner money can buy . . .

Two *massive* 250 pf transmitting variable capacitors can handle *amps* of RF current and *6000* RF volts. Logging scales.

Precision ball bearing roller inductor, three digit turns counter and spinner knob give you exact inductance control for minimum SWR.

Lighted *peak*/average Cross-Needle SWR/Wattmeter has 200/2000 watt ranges. Super heavy duty *current* balun has two giant 2½ inch powder iron toroid cores wound with *Teflon®* wire.

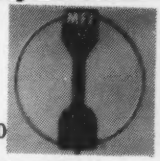
Six position *ceramic* antenna switch has extra large contacts. Flip stand, dummy load, one year *unconditional* guarantee, aluminum cabinet, tough *baked-on* paint, locking compound on nuts/bolts, handles 3 KW PEP, 10½x4½x15 in. Meter lamp needs 12 volts. Add $13 s/h.

MFJ *No Matter What*™ Guarantee

MFJ's famous one year *No Matter What™ unconditional* guarantee means we will repair or replace (at our option) your MFJ product sold in this ad *no matter what* for a full year.

Super Hi-Q Loop Antenna

MFJ-1786 **$249.95**



Tiny 36 inch diameter high efficiency loop antenna covers 10-30 MHz *continuously* with low SWR. Handles 150 watts.

Ideal for home installations where space is limited -- apartments, condos, small lots. Take on trips.

All welded construction.

Remote control has *Automatic Band Selection™*, Cross-Needle SWR/ Wattmeter. No control cable needed. Use batteries or 110 VAC. Add$20 s/h.

No ground or tuner needed.

MFJ-1782, $219.95, like MFJ-1786 but remote control has only slow/fast tune buttons.

Dual Band Mobile Ant.

Mobile Antenna for 144/440 MHz

MFJ ***dual band*** magnet mount mobile antenna for 144/ 440 MHz has 19 inch stainless steel radiator, low SWR. UHF mobile (MFJ-1724B) or BNC handie talkie (MFJ-1724BB) connector.

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Maximum Gain™ 5/8 Wave 2 Meter ***magnet mount*** mobile antenna has stainless steel radiator, 12 ft coax, low SWR. UHF mobile (MFJ-1728) or BNC handie-talkie (MFJ-1728B) connector.

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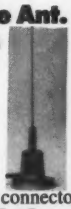

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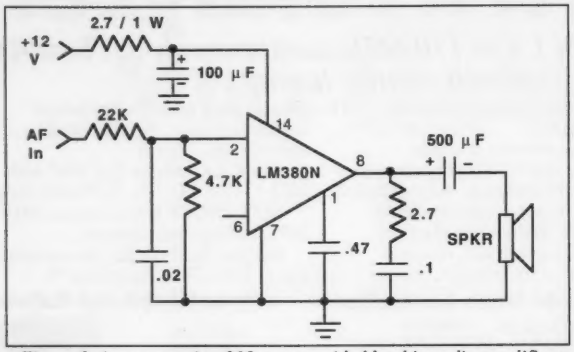

Figure 1. An extra gain of 10 was provided by this audio amplifier.

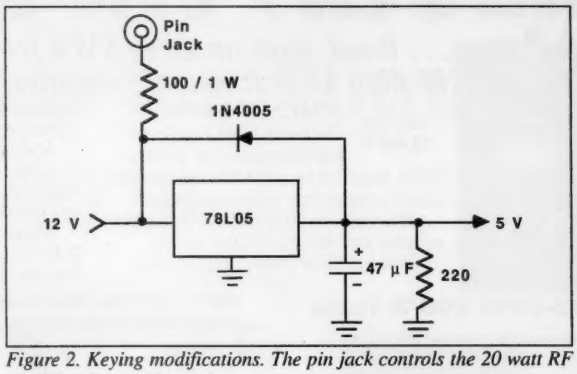

Figure 2. Keying modifications. The pin jack controls the 20 watt RF amplifier for semi break-in.

fied and filtered 120 volt line without the need for a step-down transformer. The amplifier was built into a 4" x 6" plastic cardfile box. Radio frequency transformers are used for the input and output to keep the high voltage inside where it belongs. High-voltage MOSFETS have been improved considerably in the last few years. Our amplifier runs at 50% efficiency and will withstand moderate antenna mismatches, but that is a subject for another article. A general discussion of high-voltage MOSFET amplifiers was published in *RF Design* (Vreeland, R.W.: "An Ultra Light-Weight Transmitter Using High-Voltage MosFets," August 1985, pp. 46-50) and in *QEX* (Vreeland, R.W.: "Notes On a Light-Weight Portable CW Transmitter With a Transformerless Power Supply," June 1988, pp. 11-13).

Add a Dipole

The station (Photo C) was completed by the addition of a 12 volt regulated supply (Edlie TE626-24: Edlie Electronics, 2700 Hempstead Turnpike, Levittown NY 11756-1443). Did I say completed? Well, not quite. What good is a station without an antenna? And how do you fit a half-wave dipole into a hotel room? The obvious answer is the inductively loaded dipole shown in Figure 3. The coils are wound on sections of 1-1/16" outside diameter PVC water pipe using Archer 278-1218 #22 gauge hookup wire. The method of anchoring the wire is shown in Figure 3. The wire was threaded down through one hole and up through the adjacent one. I fed the dipole through a 22-foot length of RG-58/U (Archer 278-971).

Tuning was done by adjusting the lengths of the end sections. A bowline was tied in each end to form a loop for supporting the antenna. The end sections for my antenna are 38 inches long as measured to the outer end of the loop. It is best to start with at least 42 inches of wire to allow for pruning. I have found the MFJ-207 SWR Analyzer to be indispensable for this purpose. When properly tuned the antenna will cover the entire tuning range of the MFJ-9020. The antenna should be mounted in the clear. Metal lath walls will cause detuning, as will aluminum-backed insulating material.

The question of the possible existence of non-thermal RF health hazards has not yet been answered. Until it has, it would be best to hang the antenna a reasonable distance from the operator and to refrain from running high-power. As a former 75 meter AM mobile operator, I have been exposed to moderate RF fields without noticeable ill effects. For this reason I take a fairly casual attitude toward moderate RF exposures. However, you should make your own decision. In these days when intelligent people worry about exposure to 60 Hz magnetic fields that are only one one-hundredth as strong as the magnetic field of the earth, how careful can you get? 73

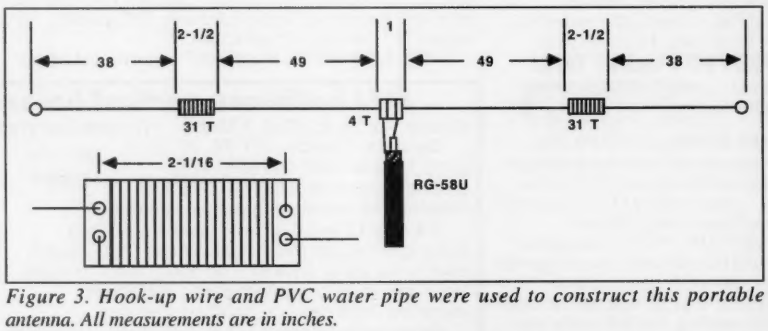

Figure 3. Hook-up wire and PVC water pipe were used to construct this portable antenna. All measurements are in inches.

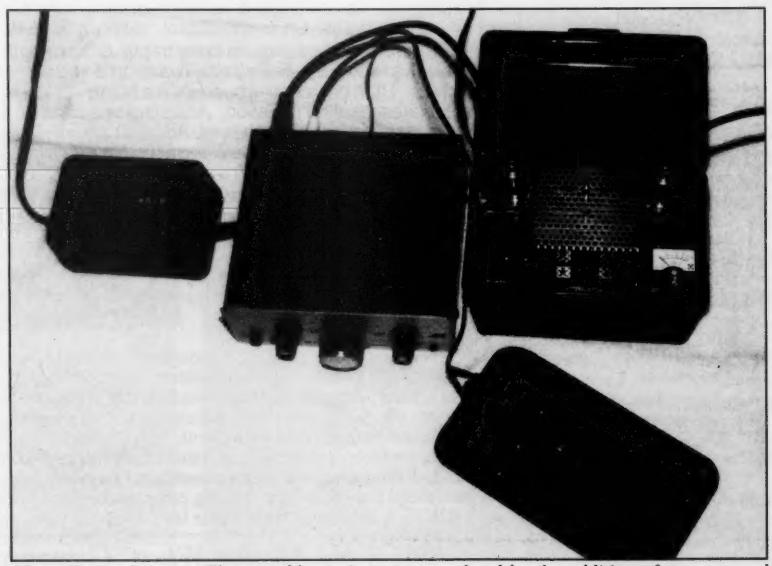

Photo C. Ready to go. The portable station was completed by the addition of a two-pound power supply (left) and a two-pound RF amplifier. Note the old reliable J-37 key mounted on a piece of circuit board.

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POWER: Handhelds-5 watts. Mobiles- 50 watts. (25w on 220MHz. and 35w on 440MHz.) Standard!

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DISCOVER VISA

Universal Automatic Minimum Power Control for AMTOR

Use just enough punch to get the job done.

by Ed C. Miller N7APE

Most of the digital communications in the ham bands is done at whatever power setting the operator chooses. I am sure most hams would prefer to operate at the minimum power needed, but with AMTOR it would require virtually constant adjustment.

The circuit described here was inspired by the automatic power control (for AMTOR) unit developed by Carl D. Gregory K8CG. It was designed for use with transceivers using external voltage control power adjust. The circuit presented here is for use with *any* SSB transceiver being used on AMTOR. It senses the same TNC signals as Carl's circuit, but uses that information to adjust the TNC audio level to the transmitter—and thus the power output. If no error signals are detected by the TNC, the transmitter power will be gradually reduced until an error is detected. It will then increase the output power level until no errors are detected. Thus, the transmitter power output will generally be at the minimum level necessary for reliable communication, meeting the FCC's requirement.

Although this circuit was designed for use with an AEA PK-232 TNC, it should be adaptable to other units with only minor modification. And, because it controls the transmitter audio level, it should work with any SSB rig.

The main unit is on a small circuit board mounted inside the TNC. It interprets the error signals from the TNC. Its input includes ground, +5 volts, and the outputs of four of the TNC LED drivers, one of which enables the power control feature in the ARQ mode. All of the digital activity is conducted on this board. Its output consists of one shielded two-wire cable that plugs into the power control section, which is an L-pad with an FET for the output leg. This pad is connected between the TNC transmit audio and the transmitter audio input. One wire provides initial bias to the FET, and the other the control voltage to the gate of the FET. With this installation, no traces are cut, so the TNC can easily be returned to its original condition.

Control for this circuit is provided by the indicator driver ICs. If the TNC is in AMTOR mode, whenever an error is detected the RQ, PHASE, or OVER indicator driver is enabled. The voltage at pins 12 and 13 of the 4093B goes negative, which in turn causes pin 3 to also go negative. C5 is gradually discharged, increasing the negative bias on the gate of the FET, reducing the loss in the T-pad consisting of Ra and the FET impedance. This increases the audio level to the transmitter, increasing its power output. When the power is raised to the point where no errors are detected, NAND Gate 2 will go positive, and the transmitted power will begin to gradually reduce. This constant automatic control of the RF output allows AMTOR usage at the minimum level necessary for reliable communication.

In any mode except AMTOR, the ARQ LED will not be lit, thus pins 5 and 6 of the 4093 will rise to +5 volts. Pin 4 will go negative, quickly discharging C4 and increasing the drain to source impedance of the FET to a very high value, causing minimum loss in the T-pad. This sets the transmitter output power to maximum in all modes except AMTOR.

Construction

The layout and construction of the main board is not critical. It can be mounted with metal brackets, using the two main board mounting screws. Care in mounting is important to prevent damaging the TNC board. Remove the bolts, then insert them in the

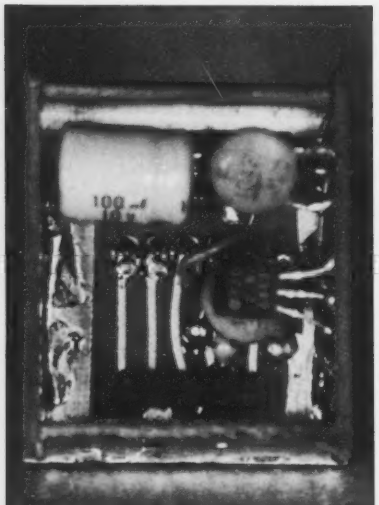

Photo A. Audio control unit (with cover removed).

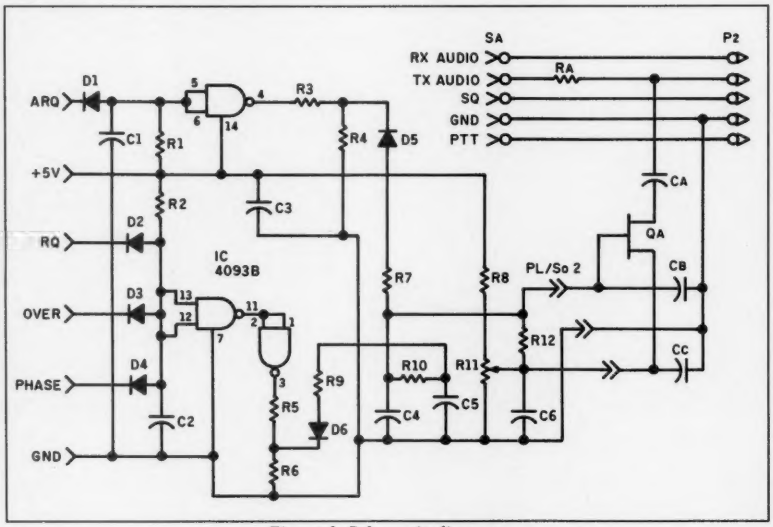

Figure 1. Schematic diagram.

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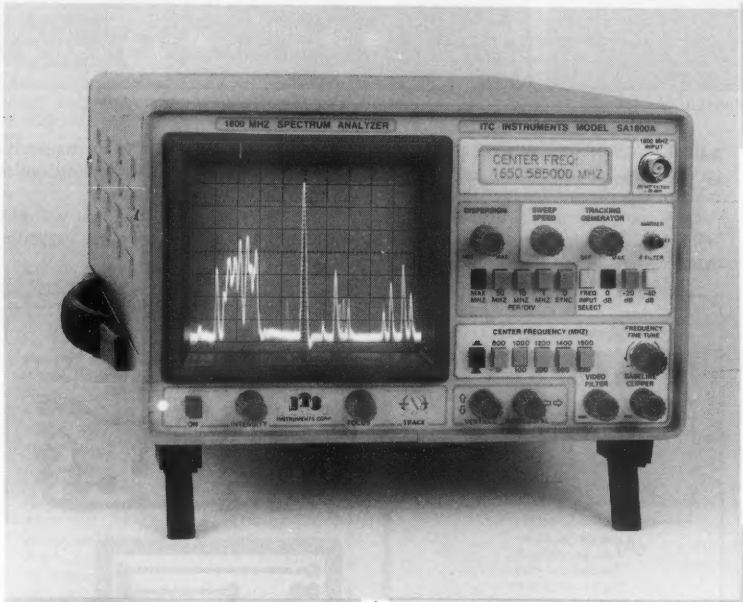

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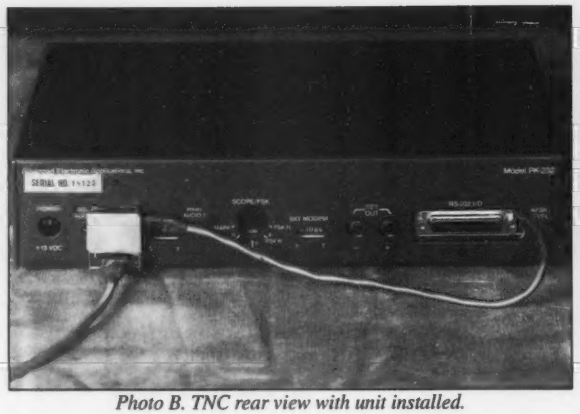

Photo B. TNC rear view with unit installed.

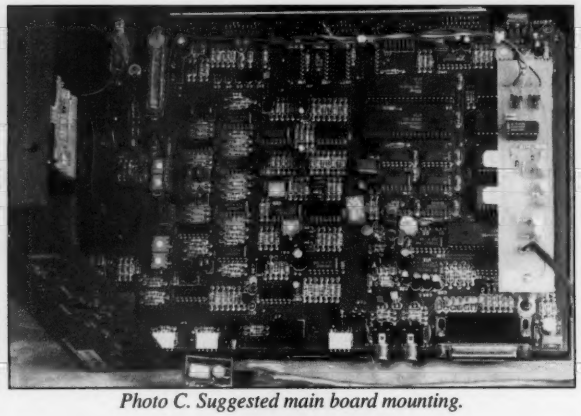

Photo C. Suggested main board mounting.

mounting brackets. Place a mica (or other insulated) washer over the front bolt, and a small metal lock washer over the rear bolt, before re-inserting the bolts. *These washers are important* in preventing damage or the introduction of a short in the TNC board, and to provide its case ground connection.

The four status sensor wires are most easily connected to the appropriate LED negative connections on the indicator board. Extreme care should be used in making these connections as some of the LEDs have PC board traces very close to them.

The T-Pad unit was made of one-sided PC board, with a metal cover. It plugs into the RADIO 2 connector on the rear of the TNC, and the RADIO 2 cable plugs into it. This compact design and layout minimizes RF interference; however, it does require a steady hand and small tools for its construction. Of course, it is not necessary to have the cable-connector assembly made in a cable-end configuration. It would work equally well in a small metal cabinet, with the male connector on it and a suitable cable to the TNC terminated in a five-pin female header.

Only one adjustment is required for setup: With the TNC operating in *any mode* other than AMTOR, adjust the trimmer resistor for maximum audio output to the transceiver. It should be set just to the point where maximum audio output is reached.

In AMTOR mode, this unit will provide an output power-control range exceeding 20 to 1.

PARTS LIST

Main Board

D1,D2,D3,D4, D5,D6	1N914 Si Diodes
C-1,C-2	180 pF poly capacitors
C-3	10 µF 25 volt electrolytic capacitor
C-4	0.1 µF 15 volt ceramic capacitor
C-5,C-6	47 µF 25 volt electrolytic capacitor
R-1,R-2	15,000 ohms carbon 1/4 watt
R-3,R-5,R-8	470 ohms carbon 1/4 watt
R-4,R-6,R-7	4,700 ohms carbon 1/4 watt
R-9	2,200 ohms carbon 1/4 watt
R-10	22,000 ohms carbon 1/4 watt
R-11	1,000 ohm trimmer potentiometer
R-12	1 megohm carbon 1/4 watt
IC 4093B	Quad dual NAND gate

Cable Connector Board

Ca	100 µF 10 volt electrolytic capacitor
Cb,Cc	0.1 µF 15 volt ceramic capacitor
Qa	2N5457 N-Channel FET
Pa	5-pin male header
Ra	1,500 ohm carbon 1/4 watt
Sa	5-pin female header

A set of both drilled and etched PC boards is available for $5.25 plus $1.50 S&H from FAR Circuits, 18N640 Field Ct., Dundee IL 60118.

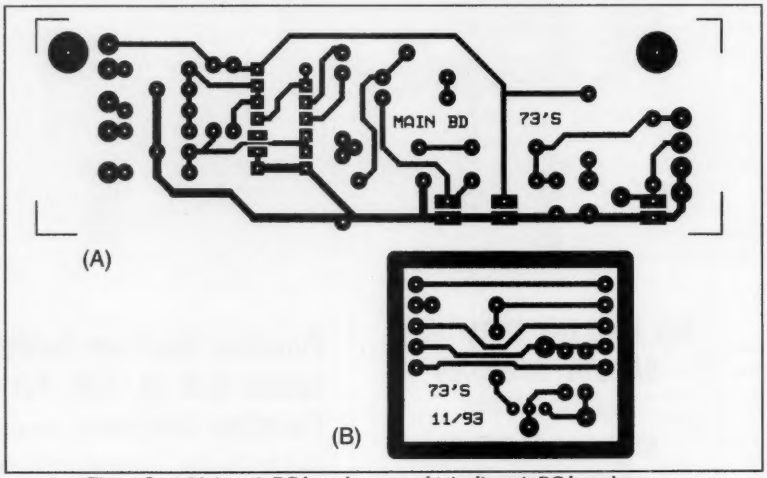

Figure 2. a) Main unit PC board pattern; b) Audio unit PC board pattern.

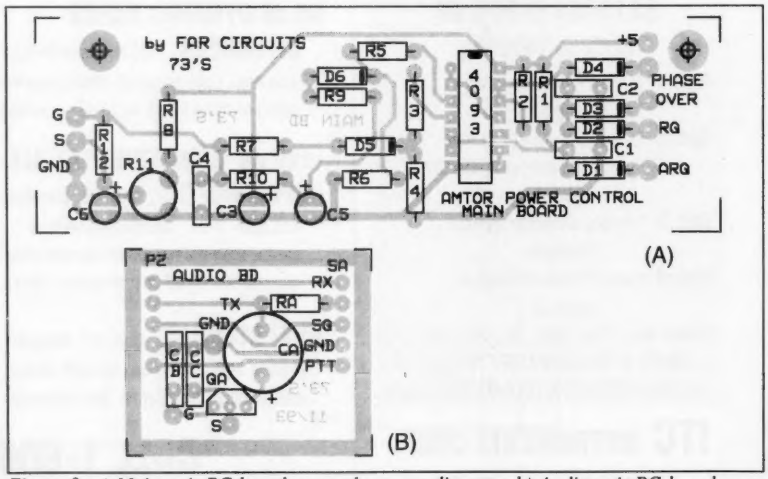

Figure 3. a) Main unit PC board parts placement diagram; b) Audio unit PC board parts placement diagram.

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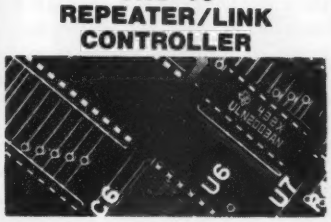

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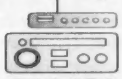

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The Challenge of QRP

An introduction to low power operation.

by Michael Bryce WB8VGE

Ham radio has become pretty comfortable for most of us. Just about anyone can chase DX with a modern 100 watt microprocessor-controlled transceiver. *But just try that using minimum power!* That's the challenge of QRP. There's nothing like working a rare DX station with only *1 watt* to sharpen your operating skills. But, of course, there's much more to QRP than DXing with low power.

What is QRP?

Well, it depends on what side of the fence you happen to be on. To me, QRP is RF output from a transmitter that is 5 watts or less, regardless of the input power to the transmitter. If you have 50 watts input and only 3 watts output, you're QRP to me. Your transmitter efficiency is really bad, but you're still QRP.

On the other hand, if you're working the CQ World Wide DX contest, and you're running a kW, by turning the amplifier off—thus dropping your power down to 100 watts—you're now QRP! In fact, let's take this one step further. Suppose the DX station you're listening to says, "QRP only please." Snap! Off goes the amplifier. You're now QRP and you make your contact with 100 watts. That's far from operating with low power.

QRP is one of the internationally recognized Q-signals meaning: "Shall I reduce power?" Or: "Reduce power to _____watts." Most hams have adopted it to identify low power equipment or operation. The QRP ARCI has formally adopted the power level of 5 watts as QRP. This is measured as output power from the transmitter. For really low, low power work, the term "milliwatting" has replaced the aged term "QRPp." The popular fire ball transmitter on 28 MHz proved it is possible to transmit coast-to-coast with 25 milliwatts! That's less power than the dial lights consume in most transceivers.

QRP is a great place to make new friends. QRP is a subculture within ham radio. Usually, when I tell someone I'm running QRP, the QSO changes from the usual, "Rig here is Kenwood and the weather here is warm" to a real chat with an interested human operator on the other end.

Building Your Own

Nothing in the world can beat the feeling of working a station using home-brewed equipment—a QSO with gear you constructed with your own hands. The warm fuzzy feeling will last for days after the QSO is over. That's a feeling you don't get when operating the newest microprocessor-controlled SSB transceiver.

One of the most challenging and satisfying things a QRP operator can do is build his or her own gear. Best of all, you don't need to be a rocket scientist or an electronics engineer to build your own rig. In fact, QRP projects are especially suited for the neophyte in home-brew construction. Building a transmitter is relatively easy. Usually there's a wide tolerance range for parts, and most transmitters are built around straightforward circuits. Sometimes the transmitter is nothing more than a one-transistor oscillator coupled to an antenna. Only a handful of parts are required to produce 2 watts on most frequencies. You'll be astonished by the amount of DX you can work with just a spoonful of parts.

Because most QRP projects are simple, you usually won't have trouble finding parts for the rig. A well-stocked Radio Shack can supply you with all the parts required for a 75 meter CW transceiver. Companies like Mouser Electronics and

Photo A. The Ten-Tec Argonaut II is a full-featured QRP transceiver.

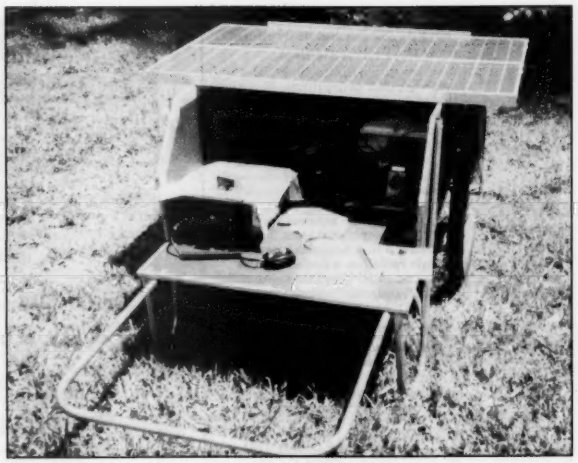

Photo B. Low power means portability. In this case, it's a solar-powered QRP wagon.

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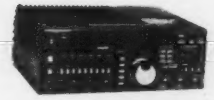

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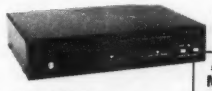

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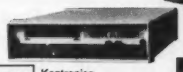

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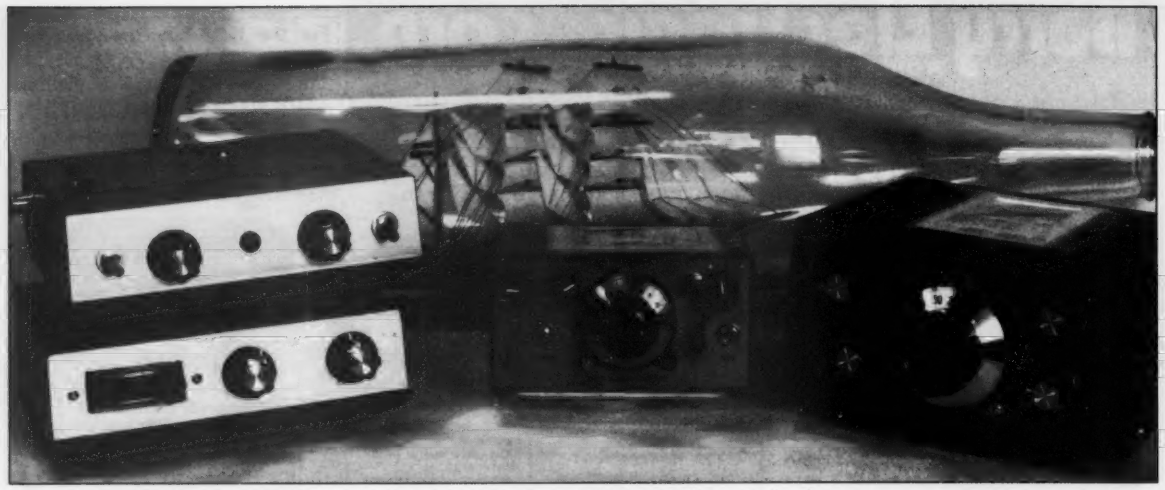

Photo C. Home-brew haven. Here is NR1A's QRP "ship in a bottle" setup.

Digi-Key will take small orders for one-sees and twosees. Several hams have started their own companies supplying small parts just to the home-builder and the QRPer.

If you have a hard time getting the parts all lined up, several different companies furnish ready-to-go kits, too. Kits range from the very simple Roner by the G-QRP club, to the fully synthesized ARK-40 from S & S Engineering.

Sometimes the challenge of QRP comes from assembling a transmitter in the smallest possible chassis. I've seen rigs built in pill bottles, band-aid boxes, a match box, and even a Sucrets box.

Most QRP construction projects center around building QRP transmitters. There's nothing stopping you from rolling your own receiver either. The popular direct conversion receiver makes a perfect marriage for the QRP transmitter. A direct conversion receiver is sensitive, and easy to build. Or you can go with several of the simpler superhet designs offered in *73*. Many of these simpler designs rival the performance of much more complex receivers.

There's one more advantage to low power operation—TVI is almost unheard of with QRP.

Equipment for QRP Use

If you are a licensed ham, then you can operate QRP without spending one cent! All you have to do is reduce your output power and, snap! You're QRP. It really is as simple as that. You don't need to heat up the soldering iron if you choose not to, although you will be losing a gratifying part of the QRP environment.

All you need is already on your operating table—your HF transceiver. You don't need a special QRP rig to enjoy low power operation, although there are commercial transceivers made especially for the low power enthusiasts. The popular Ten-Tec Argonaut II is a modern microprocessor-controlled QRP transceiver sporting all kinds of bells and whistles. The monobanders so popular today normally run QRP at 5 watts or so. Many commercial rigs, such as the ICOM IC-735, are easy to adapt to low power operation.

There's lots of used gear on the market, too. The popular Heathkit HW series of CW transceivers will still provide a lot of fun for very little cash layout. Used Ten-Tec Argonauts 505, 509 and the 515 provide 80-10 meter coverage plus SSB.

QRP and Other Frequencies

Alas, QRP is not only for HF use. Special QRP days have been set aside for the OSCAR satellites. Running too much RF on the uplink may damage

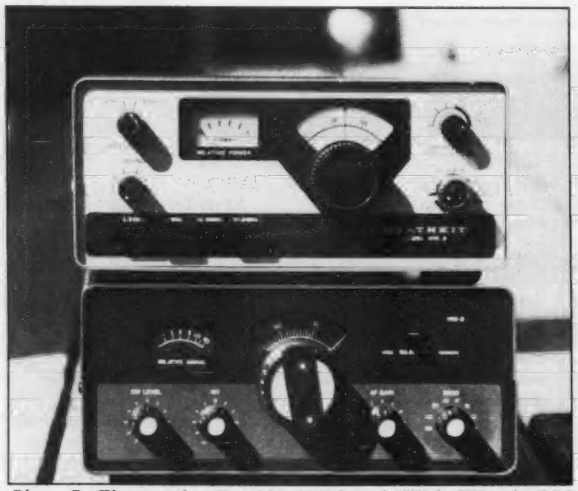

Photo D. The popular Heathkit HW-8 and HW-9 CW-only QRP transceivers. These are great fun!

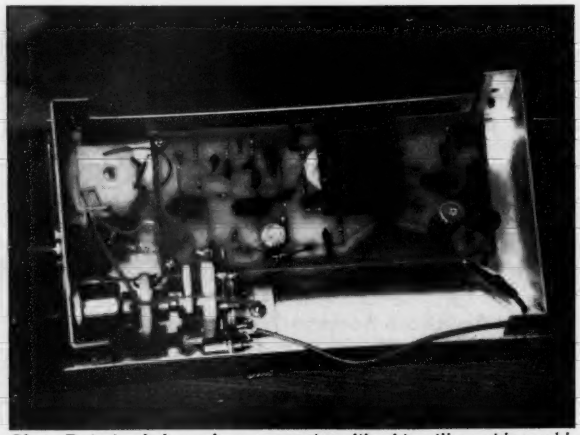

Photo E. A simple home-brew transmitter like this will provide world-wide communications without you laying out large amounts of cash.

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COM-3
$2995.00

2 WAY RADIO SERVICE MONITOR

COM-3, the world's most popular low-cost service monitor. For shops big or small, the COM-3 delivers advanced capabilities for a fantatic price—and our new lease program allows you to own a COM-3 for less than $3.00 a day. Features •Direct entry keyboard with programmable memory •Audio & transmitter frequency counter •LED bar graph frequency/error deviation display •0.1–10.000 µV output levels •High receive sensitivity, less than 5 µV •100 kHz to 999.9995 MHz •Continuous frequency coverage •Transmit protection, up to 100 watts •CTS tone encoder, 1 kHz and external modulation.

RSG-10
$2495.00

SYNTHESIZED SIGNAL GENERATOR

Finally, a low-cost lab quality signal generator—a true alternative to the $7,000 generators. The RSG-10 is a hard working, but easy to use generator ideal for the lab as well as for production test. Lease it for less than $3.00 a day. Features •100 kHz to 999 MHz •100 Hz resolution to 500 MHz, 200 Hz above • – 130 to + 10 dBm output range •0.1 dB output resolution •AM and FM modulation •20 programmable memories •Output selection in volts, dB, dBm with instant conversion between units •RF output reverse power protected •LED display of all parameters—no analog guesswork!

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CT-70 7 DIGIT 525 MHz | **CT-90 9 DIGIT 600 MHz** | **CT-125 9 DIGIT 1.2 GHz**

Ramsey Electronics has been manufacturing electronic test gear for over 10 years and is recognized for its lab quality products at breakthrough prices. All of our counters carry a full one-year warranty on parts and labor. We take great pride in being the largest manufacturer of low-cost counters in the entire U.S.A. Compare specifications. Our counters are full-featured, from audio to UHF, with FET high impedance input, proper wave shaping circuitry, and durable high quality epoxy glass plated-thru PC board construction. All units are 100% manufactured in the U.S.A. All counters feature 1.0 ppm accuracy.

NEW CT-250 2.5 GHZ

ACCESSORIES FOR COUNTERS

Telescopic ship antenna—BNC plug, WA-10	$11.95
High impedance probe, light loading, HP-1	$16.95
Low-pass probe, audio use, LP-1	$16.95
Direct probe, general purpose use, DC-1	$16.95
Tilt bail, elevates counter for easy viewing, TB-70	$9.95
Rechargeable internal battery pack, BP-4	$8.95
CT-90 oven timebase, 0.1 ppm accuracy, OV-1	59.95

ALL COUNTERS ARE FULLY WIRED & TESTED

MODEL	FREQ. RANGE	SENSITIVITY	DIGITS	RESOLUTION	PRICE
CT-50	20 Hz–600 MHz	< 25 mV to 500 MHz	8	1 Hz, 10 Hz	$189.95
CT-70	20 Hz–550 MHz	< 50 mV to 150 MHz	7	1 Hz, 10 Hz, 100 Hz	$139.95
CT-90	10 Hz–600 MHz	< 10 mV to 150 MHz < 150 mV to 600 MHz	9	0.1 Hz, 10 Hz, 100 Hz	$169.95
CT-125	10 Hz–1.25 GHz	< 25mV to 50 MHz < 15 mV to 500 MHz < 100 mV to 1 GHz	9	0.1 Hz, 1 Hz, 10 Hz	$189.95
CT-250	10 Hz–2.5 GHz typically 3.0 GHz	< 25 mV to 50 MHz < 10 mV to 1 GHz < 50 mV to 2.5 GHz	9	0.1 Hz, 1 Hz, 10 Hz	$249.95
PS10B Prescaler	10 MHz–1.5 GHz, divide by 1000	< 50 mV	Convert your existing counter to 1.5 GHz		$89.95

SPEED RADAR
$89.95 complete kit
SG-7

New low-cost microwave Doppler radar kit "clocks" cars, planes, boats, horses, bikes or any large moving object. Operates at 2.6 GHz with up to 1/4 mile range. LED digital readout displays speed in miles per hour, kilometers per hour or feet per second! Earphone output allows for listening to actual doppler shift. Uses two 1-lb coffee cans for antenna (not included) and runs on 12 VDC. Easy to build—all microwave circuitry is PC stripline. ABS plastic case with speedy graphics for a professional look. A very useful and full-of-fun kit.

BROADBAND PREAMP

Boost those weak signals to your scanner, TV, shortwave radio or frequency counter. Flat 25 dB gain, 1 to 1000 MHz. 3 dB NF. BNC connectors. Runs on 12 VDC or 110 VAC.
PR-2, wired, includes AC adapter $59.95

2M POWER AMP

Easy to build power amp has 8 times power gain, 1W in, 8W out, 2W in, 16W out, 5W is for 40W out. Same amp as featured in many ham magazine articles. Complete with all parts, less case and T-R relay.
PA-1, 40W pwr amp kit $34.95
TR-1, RF sensed T-R relay kit $11.95

FM WIRELESS MIKE KITS

FM-3 SHOWN

Pick the unit that's right for you. All units transmit stable signal in 88-108 MHz FM band up to 300' except for hi power FM-4 that goes up to 1/2 mile.
FM-1, basic unit $5.95
FM-2, as above but with added mike preamp $7.95
FM-4, long range, high power with very sensitive audio section, picks up voices 10' away $14.95
MC-1, miniature sensitive mike cartridge for FM-1,2,4 ..... $2.95

MICROWAVE INTRUSION ALARM

A real microwave Doppler sensor that will detect a human as far as 10 feet away. Operates on 1.3 GHz, and is not affected by heat, light, or vibrations. Drives up to 100 mA output, normally open or closed, runs on 12 VDC.
Complete kit MD-3 ... $19.95

MUSIC MACHINE

Neat kit that will produce 25 different classical and popular tunes, plus 3 doorchime sounds. Lots of fun for doorbells, shop, or store entrances, car horn, music boxes, etc. Runs on 9V battery or wall transformer. Excellent speaker volume and adjustable tempo and pitch. Add our case set for a handsome finished look.
Complete kit, MM-5 ... $24.95
Case + knob set, CMM-5 $12.95

PACKET RADIO

Two new versions are available for the Commodore 64 (P-64A) or the IBM-PC (P-IBM). Easy assembly "NO TUNING". Includes FREE disk software, PC Board and Full Documentation.

KIT	P-64A	$59.95
	P-IBM	$59.95
CASE	CPK	$12.95

LO NOISE PREAMPS

Make that reciever come ALIVE! Small size for easy installation with Hi-Q tuned input for peak performance. Excellent gain and noise figure—guaranteed to improve reception! Specify band: 2M—PR-10, 220 MHz—PR-20, 440 MHz—PR-40.
Each kit $17.95

TONE DECODER

A complete tone decoder on a single PC board. Features: 400-5000 Hz adjustable range via 20-turn pot, voltage regulation, 567 IC. Useful for touch-tone burst detection, FSK, etc. Can also be used as a stable tone encoder. Runs on 5 to 12 volts.
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VOICE ACTIVATED SWITCH

Voice activated switch kit provides switched output with current capability up to 100 mA. Can drive relays, lights, LED, or even a tape recorder motor. Runs on 9 VDC.
VS-1 kit $6.95

TELEPHONE TRANSMITTER

Mini-sized with professional performance. Self-powered from phone line, transmits in FM broadcast band up to ¼ mile. Installs easily anywhere on phone line or inside phone!
PB-1 kit $14.95

NEW SPEAKER PHONE

Talk on the phone hands-free, great to put in shop or shack, press the button to answer—no actual phone needed. Works same as commercial units. Talk from anywhere in room, phone line powered—no battery needed. Super for family and conference calls or buy two for hands-free intercom! Add our case set for a pro look.
SP-1 ..... $29.95 Case-CSP $12.95

TICKLE STIK

A shocking kit! Blinking LED attracts victims to pick up innocent-looking can—you watch the fun! Ideal for office desks, parties, nosey know-it-alls!
TS-4 kit $9.95

LIGHT BEAM COMMUNICATORS

Transmits audio over infrared beam up to 30'—use simple lenses to go up to ¼ mile! Hum free, uses 30 kHz carrier. Great for wireless earphones or undetectable "bug." Transmitter + receiver set, LB56 .. $19.95

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Full-fledged superhet, microvolt sensitivity, IC detector and 10.7 MHz IF. Tunes Std. FM broadcast band as well as large portions on each end. Ideal for "bug" receiver, hobby experiments or even as FM radio!
FR-1 kit $19.95

SUPER SLEUTH

A super sensitive amplifier which will pick up a pin drop at 15 feet! Great for monitoring baby's room or as general purpose amplifier. Full 2W rms output. Runs on 6 to 15 volts, uses 8–45 ohm speaker.
BN-9 kit $6.95

BROADBAND PREAMP

Very popular sensitive all-purpose preamp, ideal for scanner, TVs, VHF/UHF rigs, counters. Lo noise, 20 dB gain, 100 kHz–1 GHz, 9V–12 VDC operation.
SA-7 kit $14.95

•2 METERS •223 MHz •440 MHz

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Ramsey breaks the price barrier on FM rigs! The FX is ideal for shack, portable or mobile. The wide frequency coverage and programmable repeater splits makes the FX the perfect rig for Amateur, CAP or MARS applications. Packeteers really appreciate the dedicated packet port, "TRUE-FM" signal and almost instant T/R switching. High speed packet? ..... No problem. Twelve diode programmed channels, 5W RF output, sensitive dual conversion receiver and proven EASY assembly. Why pay more for a used foreign rig when you can have one AMERICAN MADE (by you) for less. Comes complete less case and speaker mike. Order our matching case and knob set for that pro look.

FX-146 kit (2 Meters)	$149.95
FX-223 kit (1¼ Meters)	$149.95
FX-440 kit (3/4 Meters)	$169.95
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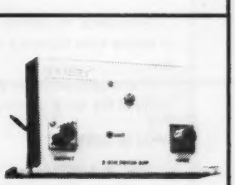
2 MTR & 220 BOOSTER AMP

Here's a great booster for any 2 meter or 220 MHz hand-held unit. These power boosters deliver over 30 watts of output, allowing you to hit the repeater's full quieting while the low noise preamp remarkably improves reception. Ramsey Electronics has sold thousands of 2 meter amp kits, but now we offer completely wired and tested 2 meter, as well as 220 MHz, units. Both have all the features of the high-priced boosters at a fraction of the cost.
PA-10 2 MTR POWER BOOSTER (10 X power gain)
Fully wired & tested $89.95
PA-20 220 MHz POWER BOOSTER (8 X power gain)
Fully wired & tested $89.95



QRP TRANSMITTERS HAM RECEIVERS

20, 30, 40, 80M CW TRANSMITTERS

Join the fun on QRP! Thousands of these mini-rigs have been sold and tons of DX contacts have been made. Imagine working Eastern Europe with a $30 transmitter—that's ham radio at its best! These CW rigs are ideal mates to the receivers at right. They have two-position variable crystal control (one popular QRP XTAL included), one watt output and built-in antenna switch. Runs on 12VDC. Add our matching case and knob set for a handsome finished look.
Your choice of bands $29.95
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Matching case & knob set, CQRP $12.95

20, 30, 40, 80M All Mode RECEIVERS

Build your own mini ham station. Sensitive all-mode AM, CW, SSB receivers use direct conversion design with NE602 IC as featured in *QST* and ARRL handbooks. Very sensitive varactor tuned over entire band. Plenty of speaker volume. Runs on 9V battery. Very EASY to build, lots of fun and educational—ideal for beginner or old pro. New 30-page manual. Add the case set for well-fitted professional look.
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(Specify band: HR-20, HR-30, HR-40, HR-80)
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E-Z KEY CMOS KEYER

Send perfect CW within an hour of receiving this kit! Easy-to-build kit has sidetone oscillator, speed control and keys most any transmitter. Runs for months on a 9V battery. 28-page manual gives ideas on making your own key for extra savings. Add our matching case set for complete station look.
CW-7 kit $24.95
Matching case knob set, CCW $12.95

2, 6, 10 MTR, 220 FM RECEIVERS

Keep an ear on the local repeater gang, monitor the cops, check out the weather or just plain listen around. These sensitive superhet receivers are just the ticket. They tune any 5 MHz portion of the band and have smooth varactor tuning, dual conversion with ceramic IF filters, AFC, adjustable squelch and plenty of speaker volume. Runs on 9V battery and performance that rivals the big rigs! For a complete finished pro look, add our matching case and knob set with screened graphics.
FM communications receiver kit $29.95
Specify band: FR 146 (2m), FR6 (6m), FR10 (10m), FR-220 (220 MHz)
Matching case & knob set, CFR $12.95

ACTIVE ANTENNA

Cramped for space? Get longwire performance with this desktop antenna. Properly designed unit has dual HF and VHF circuitry and built-in whip antenna, as well as external jack. RF gain control and 9V operation makes unit ideal for SWLs, traveling hams or scanner buffs who need hotter reception. The matching case and knob set gives the unit a hundred dollar look!
AA-7 Kit $24.95
Matching case & knob set, CAA $12.95

SPEECH SCRAMBLER

Communicate in total privacy over phone or radio. Kit features full duplex operation using frequency inversion. Both mike and speaker or line in/out connections. Easy hookup to any radio, and telephone use requires no direct connection! Easy to build 2 IC circuit. Can also be used to descramble many 2-way radio signals. Finish your kit off with the handsome case & knob set.
SS-7 kit $29.95
Matching case & knob set, CSS $12.95

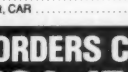
FM STEREO TRANSMITTER

Run your own stereo FM station! Transmit a stable signal in the standard FM broadcast band throughout the house, dorm or neighborhood. Connects easily to line outputs on CD player, tape decks, etc. Runs on 9V battery, has internal whip antenna and external antenna jack. Add our case set for a "station" look!
FM-10 kit $29.95
Matching case set, CFM $12.95

SHORTWAVE RECEIVER

Fantastic receiver that captures the world with just a 12" antenna! Can receive any 2 MHz portion from 4–11 MHz. True superhet has smooth varactor tuning, AGC, RF gain control, plenty of speaker volume and runs on a 9V battery. Fascinating Scout, school or club project provides hours of fun for even the most serious DXer. For the car, consider our shortwave converter. Two switchable bands (in 3–22 MHz range), each 1 MHz wide—tunable on your car radio dial. Add some interest to your drive home!
Shortwave receiver kit, SRI $29.95
Shortwave converter kit, SCI $27.95
Matching case set for SRI, CSR $12.95
Matching case set for SCI,CSC $12.95

AIRCRAFT RCVR



Hear exciting aircraft communications—pick up planes up to 100 miles away! Receives 110–136 MHz AM air band, smooth varactor tuning superhet with AGC, ceramic filter, adjustable squelch, excellent sensitivity and lots of speaker volume. Runs on 9V battery. Great for air shows or just hanging around the airport! New 30-page manual details pilot talk, too. Add case set for "pro" look.
AR-1 kit $24.95
Matching case set, CAR $12.95

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or shorten the life of the bird's battery system.

Then there's meteor scatter and mountaintopping using low power. It's possible to work numerous states under favorable conditions using 100 mW of RF on 10 GHz. QRP is very much alive on frequencies above 30 MHz.

Lower Your Electric Bill, Too

Do you own an HT? Then you've more than likely gone QRP at one time or another.

How many times have you said, "I've switched to low power. How is my signal into the repeater now?" Perhaps it was unknown to you at the time, but you had just discovered two important facts about QRP. First, you don't need full power all the time to have dependable communications. Second, running QRP will stretch your battery's life, greatly expanding your ability to communicate longer without plugging in.

Because QRP equipment is normally

QRP Q&A

Ever since my Novice days, I've been running QRP. I've collected files full of letters from hams all over the world asking about low power communication.

There seemed to be a pattern developing in the questions, so I picked out some of the more common ones. Here they are, in no particular order. Enjoy!

What is QRP?

QRP is a term adopted from the international RQS signals meaning to reduce power. Hams have taken this term and its meaning to be low power. Generally, QRP is 5 watts or less from the transmitter, regardless of the input power to the transmitter. If you hear someone on 40 meters calling CQ QRP, he (or she) is calling for a low power station. More than likely, they will be using low power, too.

What is QRPp?

QRPp is the older term for RF power of 1 watt or less. That extra small "p" meant really low, low power, generally under 1 watt. That term has been replaced by the term "milliwatting." While it may be hard to believe, you really can work around the world with an output power of 50 milliwatts! There have been many hams working DXCC with only 100 milliwatts to the antenna. It is hard to do, but not impossible.

What are the most popular QRP bands?

There really is no one band more popular than the others. You'll find QRP operation everywhere from DC to light. But, some consider the 40 meter band around 7.040 MHz to be QRP Central. You can also find some action on 7.035 MHz and 7.060 MHz. In the winter time, when summer QRN is down, 80 meters is very popular during long cold nights. There is QRP activity on 160 meters, too.

The 30 meter band is a QRPer's delight! Try 10.106 and up for low power signals. Then, let's not forget about the 20 meter band either. This is by far the most popular ham band when it comes to working DX. Low power operation used to be located around 14.060 MHz, but alas, other forms of digital signals have been moving down, overtaking the QRP-calling frequency. Check the entire band for QRP operators—they're everywhere on 20. You can find QRP signals on 17, 15, and 10 meters, too.

I'm not into CW. Can I still operate QRP?

CW is by far the most popular mode of QRP operation. It's partly because CW transmitters are easier to build than SSB rigs. With CW, you get more bang for the watt, too. But, QRP is not only CW, it's any mode you want to use, including FM or SSTV. Remember: QRP means low power—not CW only.

Do I need to change rigs or equipment to operate QRP?

Of course not! Most of today's rigs can be easily turned down from a front-panel control. You'll end up with low transmitter efficiency, but you won't have to spend a dime.

How about antennas? All I have is a simple dipole.

No matter what power level you use in amateur radio, the better the antenna, the better your signal will be. Use a good grade of feedline and get the antenna as high as possible.

I enjoy a good contest now and then. How can I compete with other stations if I run only 2 watts?

Most of the major contests, such as the CQ World Wide DX contest, Sweepstakes, and even Field Day, have special low power sections. You only compete against others within the same power class. You don't have to worry about the guy running a kW because you are not in the same class.

I know many QRPers like to build their own gear. I'm not much of a builder. Can I purchase a commercial QRP transceiver?

It's too bad you don't like to build your own gear. You're missing out on a lot of fun. But yes, you can purchase a commercial QRP transceiver. Ten-Tec markets their Argonaut II QRP transceiver with all the *good* stuff we're used to seeing in today's gear. There are many other monoband rigs, such as the MFJ units, available. Tejas RF sells their popular Backpacker II fully assembled and tested.

Almost all of the circuits I've seen in the last few issues have been solid-state transmitters. How about us guys with boxes full of tubes?

It is the 1990s and today's technology is solid-state and microprocessors. But, if you want, you can still use a vacuum tube in a QRP transmitter. The best place to look for a circuit is in an old copy of the *ARRL Handbook*. Begin looking with the early '70s and work your way back to the '50s. Parts for those circuits may be next to impossible to locate, unless you have a really big junk box.

Can I operate packet or AMTOR?

Yup! Sure can. Again, QRP simply means low power. Any mode of communications is suitable for QRP, with the exception of moonbounce! I've had some great QSOs using AMTOR with less than 4 watts PEP.

Are there any QRP clubs to join?

Yes! As a matter of fact, I'm the publicity manager for the QRP ARCI, the largest QRP club in the world. If you would like to have one of the info kits, all you need to do is send $2 to me (2225 Mayflower NW, Massillon OH 44646) and I'll have one in the mail to you the next day.

The Michigan QRP Club also serves low power enthusiasts with the *5-Watter*. Published four times a year, *5-Watter* makes for great reading.

There is also the G-QRP club. Based in England, they publish *SPRAT*, which is full of construction projects.

I like to collect awards. Can I still do so with QRP?

Yes! There are many, many awards issued just for QRP operation. These range from a WAS with QRP endorsement to the Miles Per Watt Award. Many other contests also provide a special QRP award such as the ARRL's Sweepstakes or the CQ World Wide DX contest.

What are some of the limits of QRP?

QRP is not push-button communications! There will be times when your 2 watts just won't cut it. Band conditions, QRM, sunspots, and QRN all take their toll on a 2 watt signal. There will be times when your 2 watts or RF won't be enough to make a contact.

Some modes don't seem to work as well as others. SSB, for example, is much harder to do with QRP power levels because everyone likes that *armchair copy*. You won't be armchair copy most of the time on SSB.

AM phone is really tough on QRP! It's possible to work coast-to-coast with AM phone on the 10 meter band using QRP, but on 75 meters and 40 meters it's not going to fly.

I'm on a limited budget. Would QRP be the best way to go to enter ham radio?

QRP means low power, not inferior equipment! Don't get the two mixed together. You could pick up an HW-7 at a hamfest for under $50 and have a ball, or your could drop five grand for an ICOM-785, turn the drive down, and run QRP, too. While it is true you can pick up a brand-new rig such as the MFJ QRP monoband rig for about $150, compared to about $1,000 for an entry-level 100 watt rig, going QRP would save you money, but at a cost of only one band and being stuck with CW only.

If I start to operate QRP, what's in it for me?

No matter what you do in life, you get out what you put in. QRP really boosts your ego. Breaking a DX pile-up with 2 watts will keep a smile on your face for weeks. Working the West Coast with 1 watt from a transmitter you put together with your own hands is one of the best ways to generate those warm fuzzy feelings.

If you're tired of the quick, "Hi. Rig here is blank. Weather here is blank" type of QSO, give QRP operation a try. And if it's nothing else—*it's FUN!*

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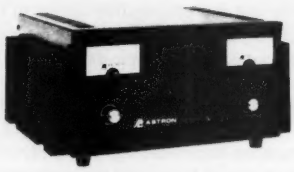

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SL-11R	•	•	7	11	2⅝ × 7 × 9¾	12
SL-11S	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R-RA		•	7	11	4¾ × 7 × 9¾	13

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RS-4L	3	4	3½ × 6⅛ × 7¼	6
RS-5L	4	5	3½ × 6⅛ × 7¼	7

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MODEL RM-35M

• 19" RACK MOUNT POWER SUPPLIES

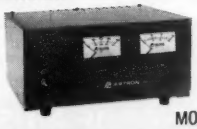
MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
RM-60A	50	55	7 × 19 × 12½	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50
RM-60M	50	55	7 × 19 × 12½	60

RS-A SERIES

MODEL RS-7A

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A		•	2.5	3	3 × 4¾ × 5¾	4
RS-4A	•	•	3	4	3¾ × 6½ × 9	5
RS-5A		•	4	5	3½ × 6⅛ × 7¼	7
RS-7A	•	•	5	7	3¾ × 6½ × 9	9
RS-7B	•	•	5	7	4 × 7½ × 10¾	10
RS-10A	•	•	7.5	10	4 × 7½ × 10¾	11
RS-12A	•	•	9	12	4½ × 8 × 9	13
RS-12B		•	9	12	4 × 7½ × 10¾	13
RS-20A	•	•	16	20	5 × 9 × 10½	18
RS-35A	•	•	25	35	5 × 11 × 11	27
RS-50A	•		37	50	6 × 13¾ × 11	46
RS-70A	•		57	70	6 × 13¾ × 12⅛	48

RS-M SERIES



MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46
RS-70M	57	70	6 × 13¾ × 12⅛	48

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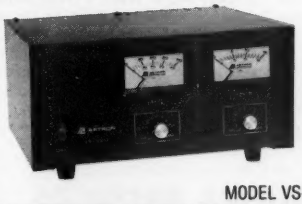

MODEL VS-35M

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VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

RS-S SERIES

MODEL RS-12S

• Built in speaker

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	•	•	5	7	4 × 7½ × 10¾	10
RS-10S	•	•	7.5	10	4 × 7½ × 10¾	12
RS-12S	•	•	9	12	4½ × 8 × 9	13
RS-20S	•	•	16	20	5 × 9 × 10½	18
SL-11S	•	•	7	11	2¾ x 7⅝ x 9¾	12

*ICS—Intermittent Communication Service (50% Duty Cycle 5min. on 5 min. off)

CIRCLE 16 ON READER SERVICE CARD

much smaller, power requirements are easily meet with small batteries. A QRP transceiver is ideal for taking ham radio with you. You can easily carry a complete HF rig, including batteries, in a backpack. Hiking, camping or even white water rafting takes on a whole new meaning now that ham radio is aboard. There's also the possibility ham radio could save a life or two while you're out camping.

Battery power is all you need for worldwide communications from your home, too. In fact, most QRPers enjoy operating their gear from batteries. Solar power and QRP operation go hand-in-hand to supply all the energy requirements of even the busiest ham.

During a natural disaster, your QRP transceiver may be the only source of communications from the disaster area. During electrical outages, running your ham gear QRP style takes on a whole new meaning.

Getting Started

The best way to start in the fascinating world of QRP is to simply reduce your transmitter power a little bit at a time. This gets your feet wet without too much pain. You can make a contact at, say, 100 watts and then slowly reduce your drive until you're at only 50 watts. Drop the power down again, and then again. You'll really be surprised as to how low you can get before the signal becomes unreadable.

QRP is not push-button operating! If you're used to making a contact on one call, then an adjustment in thinking is in order. Anyone can work station after station, many times over, using less than perfect antenna systems with 100 watts. That's not so with QRP operating.

If you're used to getting 599 reports, you'd better be ready for lots of 349 and 239 reports. With 100 watts, you're always 59 on phone; with QRP, you'll be QRZ? QRZ? the station calling. Working WAS with QRP SSB is a real challenge! But, then again, many, many times, I've been 599 with 1 watt to the antenna. That's part of the thrill of QRP, you never know what will happen.

Efficiency is the Key to QRP

I know you've heard it before, about the guy who works DX with a set of old bed springs. Well, that's not going to cut it with QRP operation. You need the best antenna system you can muster up. Don't get me wrong, you don't need an antenna farm containing enough aluminum to build a B-52 to operate QRP successfully—but it wouldn't hurt, either!

"During a natural disaster, your QRP transceiver may be the only source of communications from the disaster area. During electrical outages, running your ham gear QRP style takes on a whole new meaning."

Antennas are placed as high in the air as possible. Only the best quality feedline is used between rig and antenna. Resonant antennas instead of trapped multiband antennas provide the QRPer with improved efficiency. Anything you can do to increase efficiency will improve your chances of making a solid QSO.

Operating Hints

There are many techniques for successful low power operation. Sometimes one particular technique will work this time, and then fail the very next day. Here are some of the many techniques I've found to be helpful in keeping the logbook filled with QSOs.

Get to know the bands and how they operate. Use propagation aids to find out what band will be open and for how long. Why, you might even want to find out how to figure out the propagation charts in the back of *73*. There are disks full of computer programs to help you determine the MUF, or Maximum Usable Frequency. Using these programs will improve your QRP score. If the bands are dead, you might as well heat up the soldering iron and work on a project; QRP and crappy bands don't mix together well.

Tune the band looking for stations calling CQ. Answering the loudest station sending CQ helps, too. Another method is tail-ending a QSO. You tune around until you find a QSO in progress. After the two stations have signed, you call the loudest one. Most of the time you'll hear your call coming back. This is by far the most popular method of QRP operation.

If you only want to fill up your logbook, then work the state-side contests. The West Virginia QSO party will provide you with lots of quick QSOs. Why? Because you're an extra two points to the other station. You don't have to be in the contest to work contest stations.

Here's a strange one. Check out dead bands for activity. You never know: I've heard DX stations calling CQ on supposedly dead bands. It only takes a few minutes to tune around the high end of 10 meters for a quick check, even if the computer says the band is dead.

Anyone Can Operate QRP

A different frame of mind is all that is needed. It's the idea of doing more with less. QRP operation is surprisingly easy, fun, and a whale of a good time. It may be exactly what you need to put some snap back into ham radio. 73

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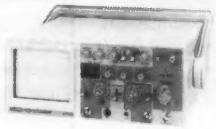

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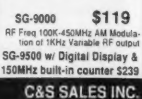

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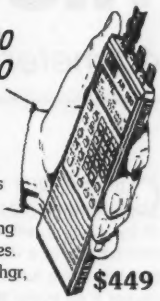

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1 ANTENNA=9 BANDS

The GARANTENNA GD-6 dipole was tested and recommended by TCA (The Canadian Amateur, similar to QST) in June 1985. The GD-6 and GD-8 were tested and recommended as first choice in a test of three wire antennas by the CNIB (Canadian National Institute for the Blind). TCA and CNIB confirmed that the GARANTENNA GD antennas need no tuner on all bands tested.

MODEL	BANDS	MAX LENGTH
GD-5	40-30-20-15-10	67'
GD-6	80-40-20-17-12-10	137'
GD-8	80-40-30-20-17-15-12-10	137'
GD-9	160-80-40-30-20-17-15-12-10	255'

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by Michael Bryce WB8VGE

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Operating QRP has always been a lot of fun for me. Operating QRP in the woods all by yourself, with a rig you built with your own hands, is a delight beyond words! You can join in the fun for yourself with the Backpacker II 40 meter transceiver from Tejas RF Technology.

The Backpacker II

The Backpacker II is based on the popular W7EL direct conversion receiver. The Backpacker II is an 1992 updated version using a doubly-balanced diode ring mixer. The Backpacker II has replaced the transistors used in the original version with low noise op amps. The results are outstanding! An improved method of frequency control is the heterodyne oscillator and mixer. In the Backpacker II, the VFO does not run at the same frequency as the transmitter. The VFO instead operates between 6.0 and 6.2 MHz in a Hartly oscillator configuration. This prevents RF from getting into the VFO and causing frequency shift or drift during key down. You get a 200 kHz segment of the 40 meter band with the VFO.

This method also allows the Backpacker II to operate on any single band (including 20, 17 and 15 meters) without losing stability due to VFO drift at the higher operating frequencies normally used in a direct conversion receiver. You could put the Backpacker II on any frequency by changing the output filters and tuned circuits. To make a band change, you'll need to change the crystal in the heterodyne oscillator and change the tuned circuit following the mixer. The tuned circuits in the amplifier stage will also need to be changed and the Backpacker II retuned. A band change kit is $10 and includes the 11 parts required for a band change. In a way, the Backpacker II is really a monoband CW transceiver for 40, 30, 20, 17 and 15 meters. Of course, you can have only one band at a time.

A RIT circuit rounds out the VFO control scheme. The RIT control features a center-detent position allowing easy zeroing of the RIT. You cannot turn the RIT function off. The range of the RIT is +/- 1.5 kHz. There is a spot control to find your signal in the receiver's passband.

The Receiver

The Backpacker II uses the Mini-Circuits Labs TUF-1 doubly-balanced diode ring mixer. Along with this mixer, additional filters reduce interference from the 40 meter broadcast stations. If you've ever operated a direct conversion receiver on 40 meters at night, you'll really relish the front end in the Backpacker II.

A low noise amp is used as an AF preamplifier. The other half of the op amp acts as an active low-pass filter designed to allow fatigue-free CW listening.

SSB Sounds Good, Too!

An LM380 audio amplifier gives the Backpacker II plenty of audio to drive a small speaker. If you're used to a direct conversion receiver with a wimpy LM386, you'll be in for a nice surprise at the amount of audio coming from this little rig. You can get a maximum of 2 watts of audio into an 8 ohm load with the LM380. A speaker is not included in the kit, but there is room-a-plenty to add one to the case if you wish. A front-mounted 1/8-inch jack for a headphone is included. In fact, all the controls for the Backpacker II are mounted on the front panel.

A second op amp provides an active CW bandpass filter. The two-position CW filter provides a 180-cycle bandwidth on CW-1 and a 110-cycle bandwidth on CW-2. Both filters are peaked at 750 cycles. You can set the bandwidth to the wide position, effectively removing the filter from the audio line. With the filters out, the bandwidth is approximately 2.2 kHz wide. A sidetone is injected to the audio channel and its injection level may be set to your own liking. The sidetone volume tracks along with the audio control.

The Backpacker II uses differential keying. This is a fancy way of saying the rig shapes the CW signal and switches over to transmit before the RF reaches the antenna. The time sequence differential, keying properly and timely, performs several T/R functions. The Backpacker II keys very nicely. It has electronic QSK keying, making for silent QSK keying with no relay chatter breaking the quiet of the woods. The receiver draws 25 mA with no signal to about 100 mA with reasonable volume. The entire Backpacker II weighs in at a mere 23 ounces.

The Transmitter

The transmitter is made up of one driver stage and the PA. The VFO signal is applied directly to the driver via a trimmer. This pot can be used to set the output power of the

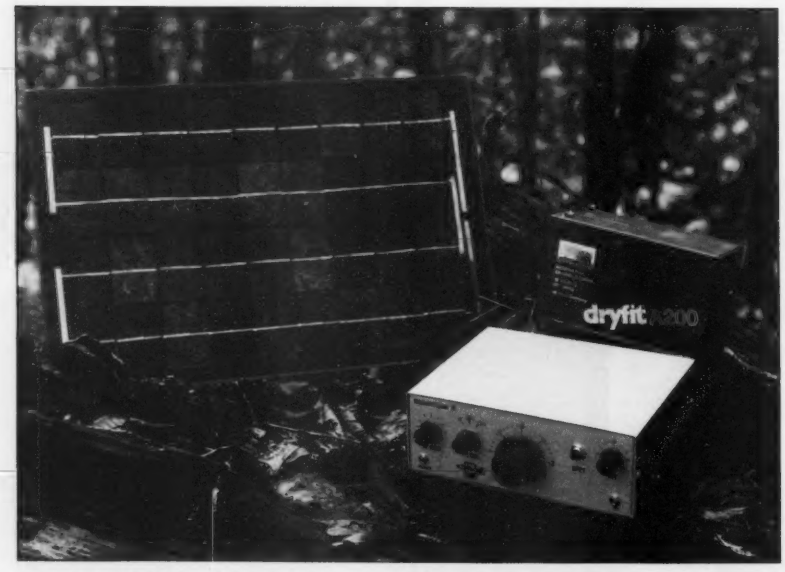

Photo A. The Backpacker II is at home in the woods. The 40 meter version is pictured here with a 10 watt solar panel and a 6.5 amp/hour gel battery providing the juice.

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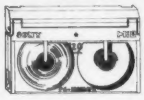

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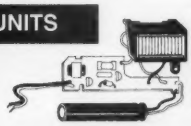

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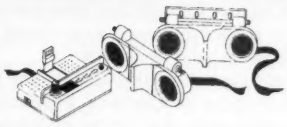

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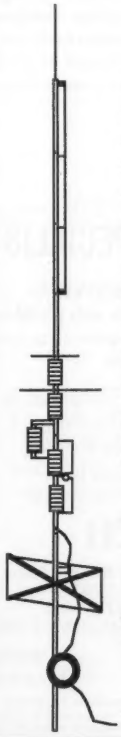

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Backpacker II. A 2SC799 provides the bang for the transmitter. The Backpacker II will produce about 2 watts output on 40 meters, more than enough to provide worldwide communications. The PA is protected against high SWR by a 36 volt zener diode. The transmitter output is fed into a half-wave low-pass filter to suppress any harmonics. The transmitter requires 12-14 volts at 300 mA.

The transmitter uses an RCA phono jack for the antenna. Thinking Bill was just being cheap, I wondered why he did not use an SO-239—until I read through the manual. The silk-screen for the antenna jack is applied low enough to allow the builder to add an antenna jack of his choice. You can use a SO-239 or a BNC connector if you wish. Of course, you can always just use the RCA jack supplied for the antenna.

Putting It Together

My Backpacker II came already assembled and tested so I did not have the pleasure of building it myself. For those looking for a diversion for the weekend, the Backpacker II is going to make you feel right at home with the soldering iron. However, the Backpacker II is not for someone building their first kit. A good basic knowledge of soldering and knowing what a diode looks like and how this guy goes on the PC board is a must. All coils come fully wound and ready to be installed.

The case needs mentioning, too. It's solid 5052 aluminum with epoxy silk-screened letters. They're tough enough to be washed with Formula 409 and still remain on the aluminum. Thankfully, there are no holes in the cabinet for dirt, twigs or critters to move in.

There are many wires connecting the three PC boards together. It would be very easy to get messed up and put the wrong wire in the wrong hole. A highlighter pen would be very useful in keeping track of what wire goes where.

The manual contains all you could ask for in getting your Backpacker II on the air. There's even a section on antennas. There is a complete parts list and a set of oversized PC parts placement diagrams. Full adjustment and set-up procedures are included. If you can't get it to work, there is also a trouble-shooting guide to help you track down the trouble. The Backpacker II comes with a 90-day parts warranty.

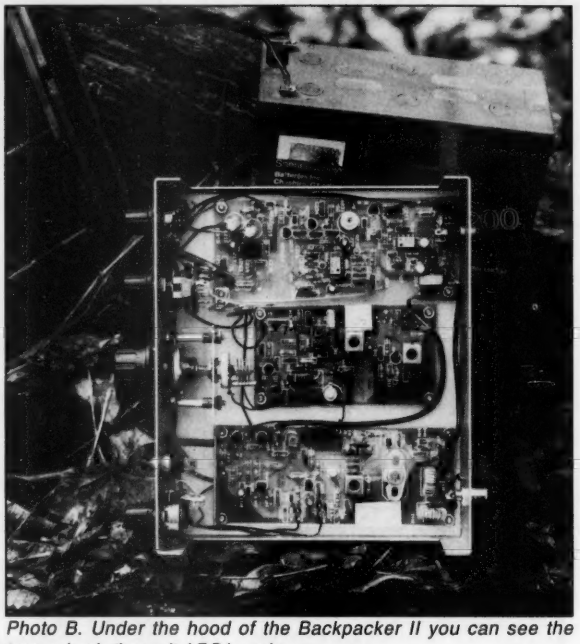

Photo B. Under the hood of the Backpacker II you can see the transceiver's three vital PC boards.

Out in the Woods

Running the Backpacker II in the woods proved to be a lot of fun! I used a random wire for an antenna and a small Ten-Tec antenna matcher. A small 10 watt solar panel and a 6.5 amp/hour gel battery provided the power.

Using a high performance direct conversion receiver is hard to describe. Signals seem to POP out of a noiseless background. There are no birdies to contend with and no phase noise from a PLL to get in the way. The time sequence differential keying proved very nice and the QSK worked quite well. With a nominal 1.5 watts out, there is enough bang to make things interesting without fretting about the batteries going flat.

I made contacts all up and down the East Coast using the Backpacker II. It's a solid 40 meter transceiver that I know you'll have a good time with. It's even more of a delight when you're working the world from your own stump in the woods. 73

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The RASER Revisited

How this superior HF dipole antenna can be improved.

by James E. Taylor W2OZH

The original article on the RASER ("The RASER: A Novel Wire Antenna System," by James E. Taylor W2OZH, *73 Amateur Radio Today*, September 1992) showed how a dipole can be extended to provide enhanced gain with a length much less than the normal two half waves in phase. This was accomplished without the need for either a high-impedance feedline or an external antenna tuner. Both end-fed and center-fed options were described. This article will show how I increased the gain of the RASER appreciably while using an improved coupler circuit, which also provides decreased feedline radiation.

The RASER Concept

The center-fed RASER for 75 meters is comprised of a dipole lengthened by self-resonant Divided Coherent Radiator (DCR) sections on either side of the center feed point. Since the RF currents in the adjacent DCR sections are essentially equal and in-phase, the antenna shown gives a power gain of roughly a factor of two over the normal figure-eight pattern of a classical dipole. Such a 20-section RASER is shown in Figure 1. Each DCR section is comprised of a chosen length of wire, which acts as an inductor, and a capacitor which, together with the inductor, forms a series resonant circuit. The wire length was chosen to be 57 inches and the corresponding capacitance was 750 picofarads. Figure 2 shows the scheme for mounting the capacitors, which were potted in insulating foam. I adjusted the antenna to resonance by changing the lengths of the two terminator wires and by selecting the capacitance in the coupler unit, shown schematically in Figure 3. The coupler unit used a bifilar-wound powdered-iron toroidal transformer for impedance matching. This 20-section RASER was used at W2OZH for over a year with outstanding results.

How Can the RASER be Improved?

Critical review of the above design gives rise to three constructive questions:

1. Could the common-mode shield radiation be decreased by placing the shield connection at the tap on the transformer, to bring it closer to the electrical center of the balanced radiator?

2. Could the capacitor in the coupler unit be eliminated by direct connection to the feedline?

3. Could the inductive component then remaining at the feed point be counteracted by increasing the capacitive reactance of the terminators, i.e. by shortening them? If so, can the number of DCR sections then be increased to improve the gain, without a net increase in the overall length of the antenna?

I investigated each of these possibilities, and made the following improvements in the design.

The Balanced Coupler Circuit

The previous coupler circuit, shown in Figure 3, which involves a simple autotransformer connection, can be redrawn as in Figure 4 to clarify ground relationships. Referring to Figure 4, the two halves of the RASER radiator naturally comprise a balanced symmetrical circuit with a virtual ground at the center. It is apparent that the shield connection is not isolated from RF ground and should ideally be placed at this center rather than at the right-hand side as shown. The unbalanced feed system shown does not discriminate against common mode coupling with its attendant feedline radiation. The circuit arrangement shown in Figure 5 would improve this situation by placing the shield connection electrically much closer to the natural virtual ground of the radiator.

I experimented with this change (Figure 5) and found that the RF current on the

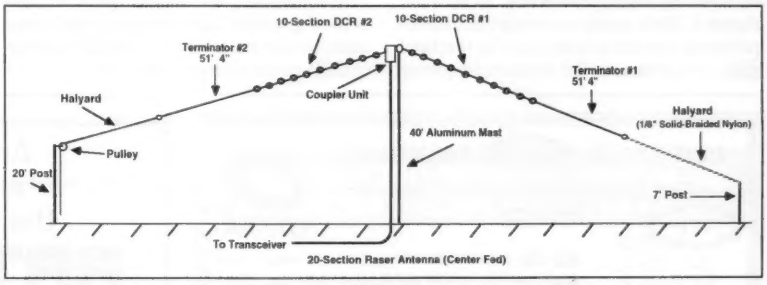

Figure 1. 20-section RASER antenna (center-fed).

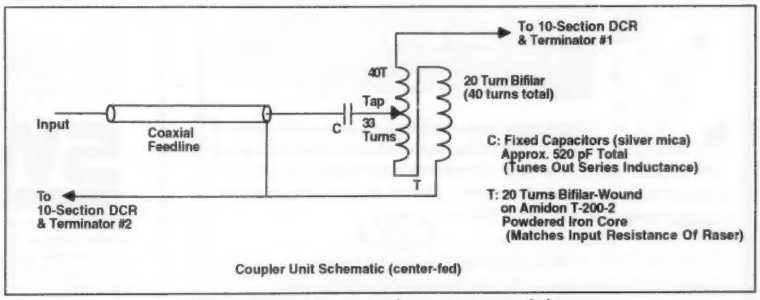

Figure 3. Coupler unit schematic (center-fed).

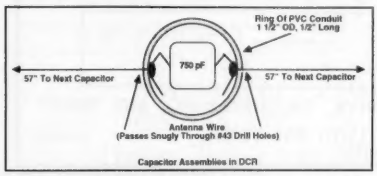

Figure 2. Capacitor assemblies in the DCR.

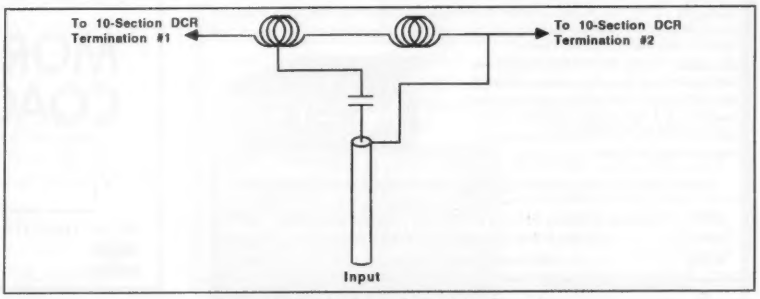

Figure 4. Original coupler unit (redrawn).

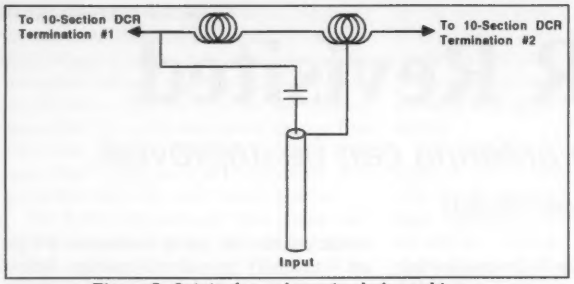

Figure 5. Original coupler unit—balanced input.

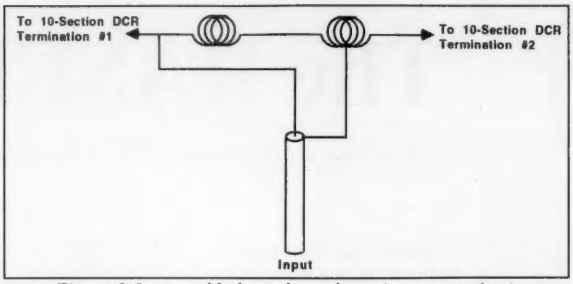

Figure 6. Improved balanced coupler unit (no capacitor).

shield of the coax, as measured by an MFJ H-field Antenna Probe, was decreased substantially. Resonance measurements using a noise bridge led to changes in the value of capacitance required for resonance. This is consistent with the measured reduction of common mode coupling, further confirming that the answer to question 1 above is "yes." During these experiments I noticed a prominent resonance point some 100 kHz below the desired frequency of 3.953 kHz. This led to experiments answering questions 2 and 3 above.

Elimination of the Coupling Capacitor

As an experiment, I replaced the coupling capacitor by a direct connection, as shown in Figure 6. This leaves a substantial uncompensated inductive reactance at the feed point, which lowers the resonant frequency of the system. The measured resonant frequency of the 20-section RASER with the terminator lengths of 51' 4" was lowered to below 3.7 MHz. Thus, the answer is "yes"—the capacitor can be eliminated.

Re-Resonating the Radiator

I then made the terminators incrementally shorter, which raised the measured resonant frequency of the radiator. Since the terminators had been made shorter I was able to add more DCR sections for greater gain without any increase of the overall space required. These experiments showed the desired deep resonance nulls on the noise bridge with very satisfactory bandwidth. Thus, the answer to question 3 above is also "yes"—the capacitor can be eliminated and the number of DCR sections can be increased.

Thus, the procedure which I followed was first to add DCR sections and then to adjust resonant frequency by changing the length of the terminators. I found that increasing the number of DCR sections to 12 on either side of center and changing the terminator length to 29 feet gave a deep resonance null (signifying a pure resistance) on the noise bridge at a frequency slightly above 4.0 MHz. This indicated that, for my available space of some 200', I could increase the number to 30 DCR sections (15' either side of center). The final RASER design is shown in Figure 7.

The Final Design Values for Two RASER Radiators

At W2OZH, a two-element phased array is used so it was necessary to optimize the

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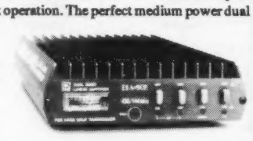

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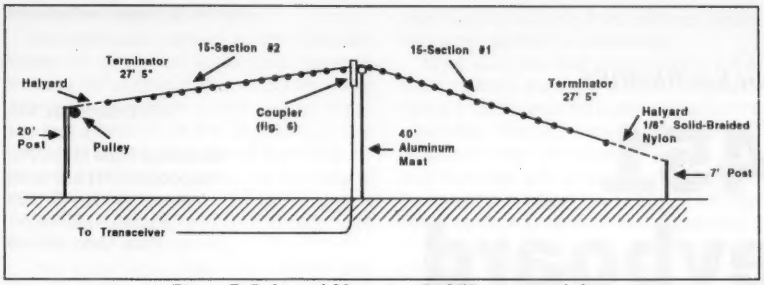

Figure 7. Balanced 30-section RASER—(center-fed).

lengths of two parallel RASERS. This simply involves adjusting the lengths of the two identical terminator wires until the desired frequency, in my case 3.9535 MHz, is approached. The final design values are shown in Table 1.

The differences between the two RASERs are probably due to the proximity of nearby buildings, trees, etc. However, these measurements indicate a level of variation to be expected in other installations of this outstandingly effective antenna.

Results

The experiments described produced the serendipitous results of a simplified design which yields improved performance. The use of a coupler connection which is balanced to ground measurably decreases the feedline radiation due to common mode coupling. The elimination of the coupling capacitor simplifies resonance adjustment and the attendant shortening of the terminator wires permits the insertion of 50 percent more DCR units to further increase the gain of the radiator.

The modifications of the RASER described above were confined to the center-fed version because this configuration is suitable for my site. However, similar changes can be made in the end-fed arrangement. The procedure would only involve reversal of the input connections to the transformer in the coupler, elimination of the capacitor by direct connection, and experimental adjustment of the single terminator wire. All other adjustments should remain as described in the original article. Although the parameters indicated above are for the 75 meter band, the design can be modified for any other band. This would involve using the steps of design described in the original RASER article, but scaled for the chosen frequency of operation. It would be interesting to see the performance of a RASER designed for, say, 20 meters, where a high gain, linear beam antenna could be realized for point-to-point DX communication.

Table 1.

Terminator Lengths	Tap Position	Resonant Frequency
27' 5" (east radiator)	25 turns	3.954 MHz
26' 2" (west radiator)	26 turns	3.948 MHz

I have now used the 30-section RASER design in a two-element phased array for several months with even better results than for the previous 20-section version. It is my perception that the directivity has been improved and the large capture area of the system for reception brings about a dramatic decrease in fading of the signals. Results experienced when I have occasionally worked QRP stations lead me to believe that this would be an outstanding antenna for that application.

I wish to acknowledge the patience of many hams who have given signal strength comparisons as I switched several available combinations of RASER elements.

UPDATES

Number 9 on your Feedback card

Nine to 10

Refer to the above article on page 56 in the July 1993 issue. KD4GRZ has pointed out a typo in the Parts List for the converter. The correct values are as follows: C4 - 0.01 µF, C7 - 0.01 µF, C8 - 100 pF, C9 - 0.01 µF, C10 - 10 µF electrolytic.

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73 Review

Number 10 on your Feedback card

by Steve Katz WB2WIK/6

The MFJ-451 Morse Keyboard

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As an avid CW operator who uses this albeit archaic mode more than any other, I was overjoyed to see MFJ introduce their new MFJ-451 Morse Keyboard; finally, an affordable, state-of-the-art product that will fit into nearly anyone's station and budget! Even better, this item is almost totally self-contained and requires no connection to a computer to make it work, allowing die-hard CW ops like me to take it portable. (I say "almost" self-contained because it does require a source of 12 VDC power and cannot be operated from an enclosed battery—too bad. Its current consumption of about 250 mA DC—3 watts!—would not allow a little 9 volt Duracell or Energizer to last very long, anyway.)

I don't know about you, but I'm really turned off by new products that take hours of set-up time and pouring through instructions to operate. This is probably why I only use computer software that is so intuitive it requires no more than loading in a disk to get going. The MFJ-451 is perfect for those of us who like to just "plug and play." Although it is supplied with a well-written, nine-page instruction manual, reading the instructions is *not* prerequisite to using the keyboard as soon as you take it out of the box. I had mine on the air within about two minutes after the UPS shipment arrived!

The MFJ Morse Keyboard is actually two items: The keyer, which is enclosed in a tiny 1-1/4" x 3-1/4" x 4-1/4" (HWD) black metal case that also contains the power ON-OFF switch, sidetone monitor volume adjust control and monitor speaker; and the keyboard, which is a standard PC-AT keyboard with a normal five-pin DIN connector (just like any PC keyboard). The keyboard supplied by MFJ is made by Mitsumi Electric Co. in Malaysia and is of very high quality with an excellent "feel," but *any* AT keyboard will work as well. The manufacturer warns that use of an XT keyboard, or using an AT keyboard switched to the "X" mode, will *not* work and may even damage the keyer, so if you don't already have an *AT*-type keyboard, I'd surely recommend using theirs. Although there are other differences, an AT keyboard is most easily recognized by its row of 12 function keys (F1-F12) across the top, above the standard typewriter keys. (XT keyboards ordinarily have just 10 function keys F1-F10, located on the left-hand side of the keyboard,

Photo A. The MFJ-451 Morse Keyboard Keyer is primarily a keyboard, as you can see. The keyer electronics is all inside the tiny black box. The front panel contains only a volume control, status indicator LED, and sidetone volume control.

arranged in two vertical columns.)

The keyboard supplied by MFJ with the Model 451 keyer has abbreviated operating instructions describing the 12 function key operations printed on a label placed in the upper-right corner of the keyboard. A key overlay or a long label placed above the 12 function keys might be nicer, but this thing is easy to get used to, and once you've used it for an hour or so, there's no longer any need to refer to the label, anyway.

The keyer unit itself is so small and lightweight that it could probably be "velcro" attached to most rigs in an out-of-the-way location. You really don't need to access its two controls (ON-OFF and sidetone monitor volume level) at all if your transmitter or transceiver has its own sidetone and you switch power to the keyer along with your radio. Although MFJ doesn't mention this in their instructions, you could also run the keyer off a regulated source of 5 volts DC with a minor rewiring job internally: Just rewire the "output" terminal of the 7805 regulator chip U5 to the "DC input" jack on the rear panel of the keyer, and it will run on 5V; however, if you do this, be sure to *never* connect that jack to a higher-voltage source, or you'll risk destroying the 80C32 keyer chip U1!

The keyer has just five rear-panel connections: Keyboard In (five-pin DIN), Power In (12 VDC, using a standard 2.1 mm coaxial plug with center positive); Paddle In, which allows use of a conventional three-terminal electronic keyer paddle, should you decide at some times to not use the keyboard (3.5 mm stereo "mini" phone plug); External Speaker Out, to override the internal monitor speaker (standard 3.5 mm monaural "mini" phone plug); and Keyer Out, which is the keyed line to your transmitter (RCA phono plug). The keyer output can be arranged to key both positive and negative-polarity transmitters and comes factory-wired to support positive-keyed solid-state transmitters. MFJ calls this "direct" keying (as opposed to "grid-block" negative keying, used in many older, tube-type rigs) and uses a VN10KM power FET as the internal keying switch—a good choice of device for the application.

Like all keyboard keyers I've seen, the keyer uses a buffer between the keyboard and the keyed output line, so you can "type ahead" of your actual sending speed, up to a maximum of 200 characters. Adjusting the keyer sending speed to be precisely the same as your typing speed will result in "real time" sending, which is very tricky at best and leads to jerky-sounding sending. It is much better to set the sending speed to be somewhat slower than your actual typing speed, and use the "type ahead" buffer to take up the slack. Since I type at 75-80 wpm (375-400 characters/minute), and nobody can really copy code that fast, I found it convenient to set the sending speed (accomplished by depressing F3 and then typing a two-digit speed from "05" to "99" wpm) at a normal conversational rate of maybe 20-30 wpm. Then I happily type away at my more comfortable, faster speed. For a real typist, this takes no getting used to at all, but for a "hunt and peck" typist, this might take a bit of self-training.

To let you know that you're running out of buffer memory, the keyer sidetone frequency lowers in pitch when the buffer is filled to 180 characters. When the 200-character buffer is completely filled, the sidetone will sound an error message with all additional keystrokes. Pressing the "escape" key (ESC) on the keyboard while it is sending your type-ahead message will immediately stop the keying and clear the buffer. Pressing the "pause" key (upper right-hand corner of the AT keyboard, next to "scroll lock") will stop the message, allow you to insert additional text using a paddle key, and *not* clear the remaining buffer memory; then, pressing the "escape" (ESC) key will continue playing the buffer memory where it left off before pressing "pause."

In addition to the sending speed being adjustable by keyboard command as described earlier, additional adjustments may be made for sidetone frequency (F2); keyer weighting (F4); two 100-character messages which may be preprogrammed (F5 and F7); playing the contents of those two memories (F6 and F8); putting your transmitter into the "tune" mode

Photo B. The rear panel of the MFJ-451 keyer box contains I/O ports for: 12 VDC in; keying output; external speaker; paddle input; and keyboard input.

by sending continuously (similar to closing a hand key) by using another function key (F1); and even converting the keyboard space bar to a hand key (F12). When you're entering text into one of the memories, your keying sounds on the local sidetone monitor but the keyer does *not* key your transmitter. Another way to practice using the keyboard while it is connected to your transmitter, when you want to hear what you're keying in on the sidetone speaker but don't want the keyer to actually send a signal over the air, is accomplished by using the Key Output Disable function (F9). Two other function keys, F10 and F11, are used for serializing messages, such as would be required in the ARRL Sweepstakes and some other contests.

The MFJ Morse Keyboard is set up to send not only regular alphanumeric characters (A-Z and 0-9), but many amateur radio prosigns as well. These include popular prosigns like BT (double dash, used between thoughts instead of a period); HH (eight dits, used to indicate "error"); AS (standby); AR (end of transmission); SK (end of contact); as well as many not-so-popular ones like AL (new paragraph); SX (dollar sign, $); KN (response expected from one station only, directed) and so forth. To use the prosigns effectively, one must pretty much memorize which single key sends them. For example, BT is sent by using the = (equals sign) key; the error message (eight dits) is sent by using the @ key; AS is sent by using the & (ampersand) key, etc. Some of these prosign assignments aren't particularly logical and it takes some getting used to, but the limitation is the AT keyboard, of course. Again, a keyboard overlay provided by MFJ might help users remember these key assignments. Regular punctuation signs like . (period); , (comma); / (slash bar, used to indicate portable operation); and ? (question mark) use the regular keys that are so labeled.

The MFJ-451 also includes three "embedded command" functions which are addressed with two keystrokes rather than a single one. For the embedded commands, CTRL (the Control key, located at the lower left and right of the AT keyboard, below the SHIFT keys) is used along with the keys for L, P or S, depending on which embedded command feature you are using. CTRL-L creates a repeated message, like a beacon identification or a CQ, which, after addressed, will play repeatedly until stopped by pressing ESC (escape). CTRL-P allows the insertion of a timed pause within a message. CTRL-S allows the insertion of a sequential serial number within a message, and, to avoid wasting time, sends the letter "N" for nine and a "T" for zero, just like experienced CW operators do. These functions are all quite handy.

The message memories addressed by F5 and F7 (and played back by F6 and F8) are limited to 100 characters each, which is more than sufficient for anything I could think of. So that you needn't count characters when programming these memories, the sidetone pitch lowers in frequency when you type past 90 characters, letting you know you only have 10 characters left in memory.

The Morse Keyboard operates as naturally as a typewriter and does not require a lot of thinking during operation. If you make a typing mistake, simply press the BACKSPACE key and the keyer will erase the last character typed and allow you to make a correction. The space bar inserts a word break space in the text, just like you are used to doing with a typewriter or word processor. The SHIFT key enables upper case characters if applicable. (In alpha text, the SHIFT does nothing; but punctuations and prosigns can be addressed and changed with the SHIFT key.)

How does it work on the air? Like a dream. As I said, this product takes literally zero familiarization period for an experienced typist, and operates intuitively enough for immediate use right out of the box. I didn't get around to reading the instruction manual—which is imprinted with the bold warning "Always Read All Instructions Before Operating New Equipment" on its cover—until after my first couple of dozen QSOs. This is the perfect device for those who, like me, enjoy instant gratification

with a new "toy." Because I hadn't used any kind of keyboard keyer in years, I was just a bit shaky during my first few contacts and sent apologies in advance for any mistakes I might make: "Bear with me, OM, I'm using a brand-new keyboard keyer, so pardon my sending." No excuses were necessary, though, as I had it all under control right from the start. Everyone complimented my wonderful "fist," although I wasn't doing anything, just happily typing my thoughts on a keyboard as I've done since I was a kid in grade school.

Dream On Department

When a product is this easy to use and so reasonably priced, I feel badly about asking for anything more. But nothing is perfect, and we hams are impossible to please, so here goes. The MFJ-451 does not make use of the numeric keypad on the right-hand side of the AT keyboard, so numbers must be sent using the numeral keys on the main QWERTY keyboard (top row). For those of us who are really used to using calculators, this is a tiny handicap: I'd rather use the numeric keypad and wish it were enabled by the MFJ firmware. Next, rather than two 100-character memories, I'd rather see four or five smaller memories. I never have anything so brilliant to send that it would require 100 characters, but I might want to use a bunch of smaller memories in a contest. Example: For contesting with a normal memory keyer (and paddle), I often load one memory with "WB2WIK;" another one with "QRZ? DE WB2WIK;" another with a full-length (3 x 3) "CQ;" another with a short (1 x 1 or 2 x 2) "CQ;" another with a brief contest exchange like "TU 599 03 DE WB32WIK BK;" another with a slightly different contest exchange like

"The MFJ-451 is the cat's meow (am I aging myself?) and definitely the thing for avid CW ops, or even casual operators who enjoy CW but are tired of banging away on a key.

"CFM TU UR 599 03 DE WB2WIK BK;" another with "CFM (or QSL) TU 73 DE WB2WIK QRZ?" and so forth. I'm used to this format, as most CW contesters are. Lastly, I wish the MFJ-451 didn't consume so much DC current and could be operated from a 9V battery so it would be a *true* stand-alone unit for portable work. (It *does* work on 12V, so most portable operations can support it, but this means another DC power cable, another set of connections, etc.) Note: For home station operation, MFJ does sell a "cube" type power supply, the MFJ-1312B Power Adapter. Many hams will already own such an accessory.

Wrapping Up

The MFJ-451 is the cat's meow (am I aging myself?) and definitely *the* thing for avid CW ops, or even casual operators who enjoy CW but are tired of banging away on a key. If you're a reasonably good typist, it will give you a perfect "fist" which can be tailored to suit your liking. For the price, I can't believe every ham who ever operated CW won't want one. The MFJ-451 is available from authorized MFJ dealers (which are everywhere) and its suggested retail price is only $89.95. MFJ's address is P.O. Box 494, Mississippi State, MS 39762. They have two unique customer service programs: (1) If you are interested in any MFJ product, they will send you the owner's manual on request, free of charge; (2) If you buy a product and need technical assistance with it, they have a toll-free help line, which is (800) 647-8324. MFJ has come a long, long way from their start as a little company producing inexpensive ham accessories and I must commend them for growing rapidly and greatly expanding their product line, manufacturing all products in the U.S., and still remaining competitive in this very aggressive marketplace.

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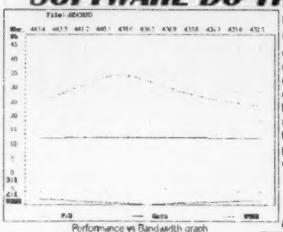
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A New Look at a Simple VFO/Exciter

Stable tuning with minimal parts.

by Ken Cornell W2IMB

Some 20 years ago many experimenters became interested in the low frequency experimenter's band. To work this band, which ranges from 160 to 190 kHz, many so-called "LOWFERS" used self-excited oscillators to avoid the high cost of low frequency crystals.

As receiving techniques improved, including the use of extremely sharp filters, a stable transmitting frequency became necessary for serious communications.

When the CMOS 4000 series of Binary Ripple Counters (frequency dividers) became available, they permitted us to use high frequency crystals for control and provided divider outputs into the 160 to 190 kHz band. The 4024 and the 4040 were popular ICs using crystals in the 5120 to 6080 kHz range; using the "divide by 32" output would put you into the band. The frequency limitations on these CMOS 4000 series was 6 to 7 MHz.

Some years ago, the high speed 74HC series and 74HCT4000 series became available and these had an operational range up to 50 MHz. The pinout of the 74HC4024 and the 74HC or 74HCT4040 are identical to their CMOS 4020 and 4040 counterparts, with the exception that their operational voltage is 6 volts maximum, making them ideal for operating with a 5 volt regulator such as the 7805.

"Due to the light coupling and apparent stable load on the oscillator with the key in either the up or down position, keying is very clean."

I got the idea of using a 74HCT4040 with a VFO operating in the 20.48 to 24.32 MHz range and using the "divide by 128" output for 160 to 190 kHz. In this case, any drift in the oscillator would be lessened by 128 times. The end result was an extremely stable signal.

Next came the thought: Why not use this same principle to build a 160, 80 and 40 meter VFO/exciter? By using VFO tuning from 27.2 to 32 MHz, and by using "divide by 16" for 160, divide by 8 for 80 and divide by 4 for 40 meters, a stable VFO emerged.

Construction

I breadboarded several circuits and ended up with the version shown in Figure 1.

I intentionally used easily available disc ceramic capacitors to see how stable the VFO would be. Normally, silver micas and NPOs would be called for in a VFO. However, I was quite pleased with the stability after a short warm-up.

Since the oscillator is operating at a higher

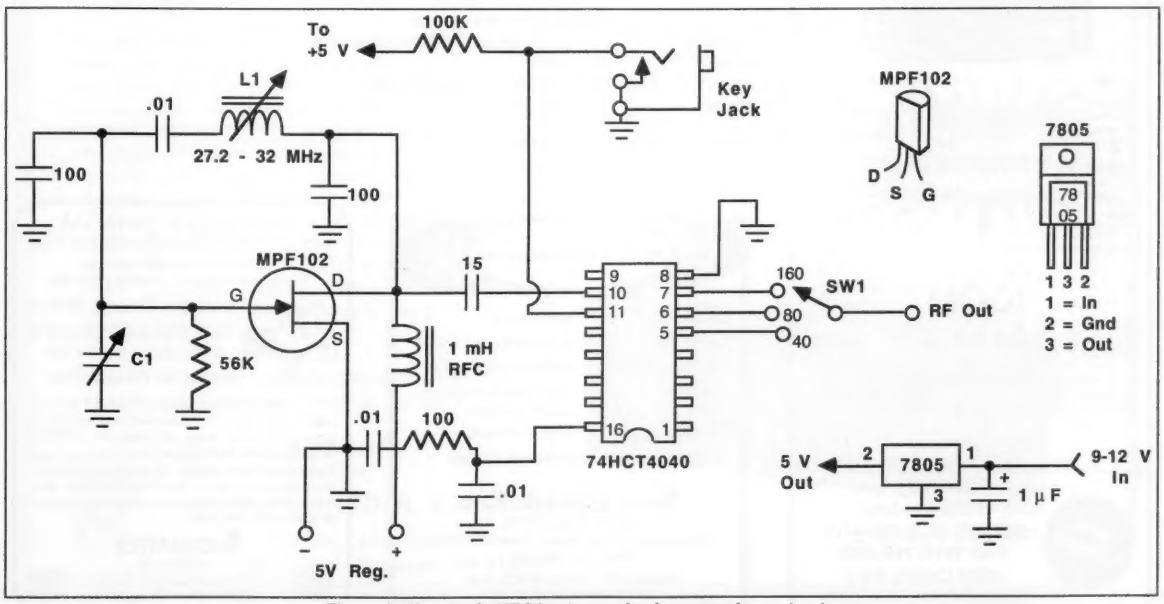

Figure 1. The simple VFO/exciter and voltage regulator circuits.

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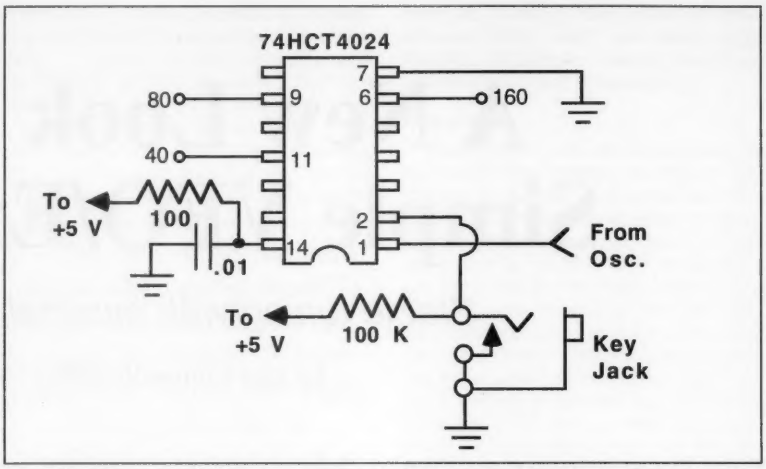

Figure 2. Pinout for substituting with the 74HC4024. Note: When the key is used and up, plus bias is applied to Pin 2 which disables the device. When the key is down, Pin 2 is grounded and the chip becomes active. This also applies to the 74HCT4040 at Pin 11.

frequency than the used frequency, it can be left running and that helps the stability.

Due to the light coupling and apparent stable load on the oscillator with the key in either the up or down position, keying is very clean.

The only difficult part is getting the proper tuning range using the slug and tuning capacitor C1. If you don't have access to a frequency counter, I suggest that you take the "divide by 16" output from pin 7 and tune your receiver to the 1500 to 2000 kHz range. Use a good variable capacitor of 50 to 75 pF for C1. Tune the receiver to 1850 kHz and with the tuning capacitor at mid-range, and adjust the slug in L1 to zero beat. The tuning capacitor should now be able to tune 1700 to 2000 kHz. If the capacitor is too large, you can add a trimmer capacitor in series with same and adjust the tuning to suit.

I suggest that, when you're satisfied with the tuning range, a vernier drive be used for C1. Actually, a fixed capacitor for C1 could be used and the tuning accomplished by using the slug adjustment.

For those who wish to substitute a 74HC4024, the pinout is shown in Figure 2.

As with any VFO, sound construction should be used and the circuit should be enclosed in a shielded cabinet.

Parts Description

C1	See text.
L1	9 turns #22 solid insulated hook-up wire wound on a 5/16" diameter slug tuned form for a 3/4" winding length.
Capacitors	All High "Q" disk types with values as shown.
Resistors	All 1/4 watt.
SW-1	Rotary switch, three positions used.
Key jack	To suit your key plug.

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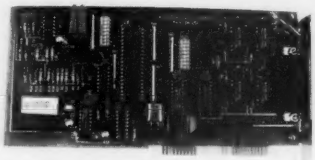

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by Michael Bryce WB8VGE

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I've said it before many times: "What the world needs is a low-cost synthesized QRP transceiver." Of course, all my friends tell me that's a pipe dream and I'll never see it. Well, it's the '90s—and the folks at S & S Engineering have made my dream come true.

The ARK 40

The ARK 40 is a fully synthesized QRP transceiver running 5 watts on the 40 meter band, a *favorite* QRP band. Band coverage is 7.000 to 7.1999 MHz. Several other bands are also in the works, including 20 and 30 meters. The ARK 40 is a CW *only* transceiver. Full break-in (QSK) keying is used in the ARK 40.

The ARK 40 utilizes a superhet receiver with a bandpass of 600 Hz. The receiver tunes in 100 Hz steps via a push-button thumbwheel. The four digits of the push-button tuning switch represent 100 kHz, 10 kHz, 1 kHz, and 100 Hz respectively.

Sensitivity is rated at 0.3 µV {10 dB (S + N)/N} with a blocking dynamic range greater than 75 dB. The third order intercept point is a rather impressive >+10 dB. The ARK 40 comes to you as a kit, for under $270. An optional keyer is $40 and fits inside the ARK 40. The keyer is based on the Curtis 8044 chip. There is enough room inside to install your own keyer board, too.

The ARK 40 comes with a guarantee to work as specified or the manufacturer will fix it for you. If there is a problem caused by a fault of their own, it will cost you only one-way postage to the factory. If it's your fault, they'll fix it for under $25. The manual gives all the details of the guarantee.

A Look Inside

What makes the ARK 40 stand out among the rest of the QRP monobanders is the synthesized frequency control for both the receiver and the transmitter. By using two phase-locked loops, the expense and complexity of a microprocessor or Direct Digital Synthesizer is avoided.

Signals from the antenna must pass through a low-pass filter and a bandpass filter before reaching the diode mixer. The bandpass filter is approximately 300 kHz wide. The ARK 40 really holds its own during the nighttime SW broadcast station QRM, thanks to the excellent front-end filters. There is no RF gain control.

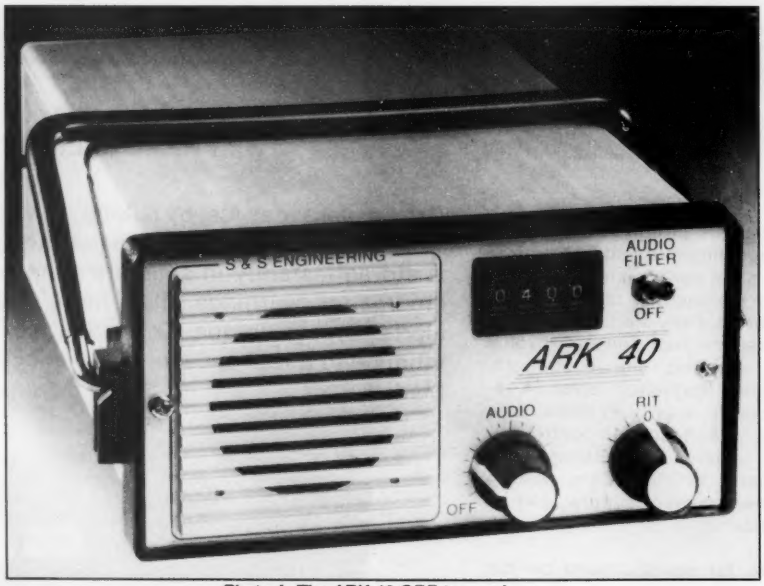


Photo A. The ARK 40 QRP transceiver.

By generating a 19.0000 to 19.1500 MHz signal on the synthesizer board, and then injecting it to the mixer on the transceiver board, the result is a 12 MHz IF frequency. The IF filter consists of four matched crystal filters. The output of the crystal filter goes to a variable gain amplifier controlled by the AGC amplifier. The AGC provides good control of the audio, without a lot of pop and click. There are no clicks or thumps during keying. The AGC action is one of the nicest I've used in a QRP rig in some time. A MC3361 IC is used as a product detector and BFO.

By flipping the audio filter on, you insert a 200 Hz filter into the audio chain. Audio is provided by an LM386 audio amplifier. A sine-wave sidetone generator is injected into the audio line during transmit. The sidetone volume tracks with the front-panel audio gain control. You cannot change the tone of the sidetone.

On the transmitter side, again the synthesizer provides the necessary signals required by the transmitter preamplifier and the MRF-476 final. The final is biased as a Class-C amplifier. To steal a bit of thunder from my computer hacker friends, the transmitter is "what you see is what you get." The transmitter does not "shift" down in frequency when transmitting. If you have dialed up 7.040, you transmit on 7.040.

A relay controls the T/R functions of the ARK 40. This relay supplies the required transmit key voltages and toggles the antenna between receive and transmit.

First Impressions

It's true what they say about first impressions. Opening the box of the ARK 40 proved that old saying once again. I'm impressed! The kit contains all the parts you need to fully

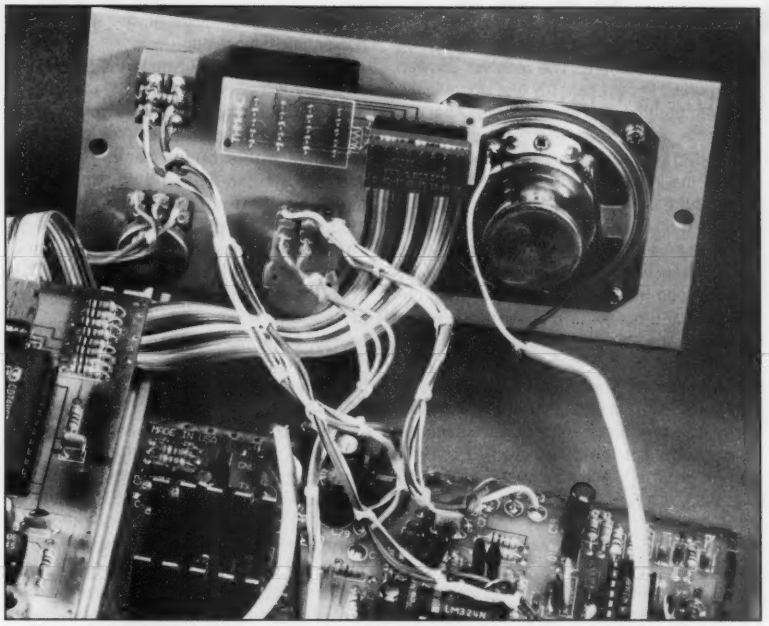


Photo B. Front panel wiring on the ARK 40 is kept nice and neat with waxed cable lacing.

assemble the ARK 40. The only thing you have to add is your time and some solder.

There are two main PC boards in the ARK 40, plus one smaller PC board for the thumbwheel buttons. The synthesizer board and the transceiver board are both the same size. Each PC board comes sealed in its own package with all of its parts. This way, you won't get the parts from the transceiver board mixed up with the parts for the synthesizer board. Both boards are double-sided with plated-through holes. The parts placement guide is also silk-screened on the boards. The boards also have been solder-reflowed, which makes soldering the parts in much easier.

Putting It Together

There are a lot of parts to the ARK 40. If you've never assembled a kit before, you'd better pass on this one. It's not a kit for first-time builders. If you don't know which end of a diode is which, don't try the ARK 40. You should be comfortable working with double-sided PC boards and ICs. You should also be able to remove a part properly should the need arise. Removing parts from a double-sided PC board can be a real pooper!

Time is the one element on your side. If you take your sweet time this can be an enjoyable project. Kits *should* be fun! I had a good time with the ARK 40 on my workbench. In fact, I find it very relaxing to assemble electronic kits. My wife calls it "solder-fume therapy." I assembled my unit during my Memorial Day vacation. The manual states it takes about 16 hours to complete, and I think that's about right. Take your time and you'll enjoy yourself.

Construction begins with the synthesizer board. One of the first things that really caught my eye was the quality of the parts used in the kit. There are ICs supplied by Harris, National, and Motorola. The same goes for the transistors—they really are marked 2N3904 instead of some off-the-wall surplus part number. All the parts are first-rate and there are no surplus parts used anywhere in the kit. In fact, as I found out later, even the SO-239 antenna connector is supplied by Amphenol; this is no hamfest special.

Because there are so may resistors in the kit, that's where you start construction. Now, either my eyes are getting bad or I'm getting old, but I had one hell of a time telling the value of some resistors from the rest. The violet and the brown on the resistors looked so much alike I ended up getting several in the wrong location. The violet paint must have been rather watery, and it sure looked a lot like brown to me. Take it from me: When building the ARK 40, measure the value of the resistors you're not sure of before soldering them in place.

The kit contained many surprises. The 10k and 1k resistors are packaged separately from the rest of the resistors. This way, you don't have to keep wading through the pile looking for them. The same can be said about the capacitors: All the 0.1 and 0.01 capacitors are packaged separately from the other capacitors. You have no idea how much time that saves in building the ARK 40.

The layout of the PC boards allows you to stuff the board like you're reading a newspaper. Starting from the top left, you go down the board until you hit the bottom, then start back up at the top middle and repeat until all the parts are installed. This way, you won't spend all day long looking for R34 after you install R33. That's because they're right next to each other on the way down the board. This procedure holds true on both the PC boards, with some slight differences.

On the foil side of the synthesizer board you must install four surface-mount capacitors. They're mighty small, but if you follow the instructions you'll have no trouble soldering them in. S & S Engineering even gives you an extra cap in case you cook one. Don't open the packages holding the surface mount caps until you're ready to install them. There is no way you'll be able to tell one value from another once they are out of their packages. Open only one value at a time, solder them in, then open up the other package.

Coils and Toroids

No one I know of likes to wind coils. So, you can relax with the ARK 40 as all the coils come pre-wound and each type comes packaged in its own little bag. You won't have to count turns of wire on a toroid to determine if it's T4 or L6. In fact, some of the transformers come with the leads pre-formed so you won't get the phasing out of whack. If you do get confused, then you can always go to the oversized drawings which show you how to double-check the coils and install them properly.

Wiring the front and back panels consumes a lot of time with this kit (and with most kits, for that matter). Take your time and you'll have no trouble with the connections. The wiring harness is color coded; it makes connections to the controls and the PC boards easy. Waxed cable lacing cord keeps the wiring from the front and rear panels to the PC boards nice and neat. I cheated here a bit and used nylon cable ties on the rear panel only. The front panel wires I laced up. Cable lacing adds a touch of class to the kit.

The Manual

Any kit worth its salt *must* have a strong manual. S & S Engineering should be very proud of the ARK 40 manual. There are the usual step-by-step instructions, but the manual doesn't go into such fine detail as Heathkit does for installing components like electrolytic capacitors.

The manual features fold-out schematics for both the transceiver and the synthesizer. Oversized PC parts placement guides, as well as foil side only overlays, are included. These overlays come in very handy when installing the surface mount parts.

S & S Engineering printed their manual on quality paper and bound it with a spiral binding so it will lay flat on your workbench. There are plenty of oversized drawings to clarify the mounting of many parts. This is especially useful with the transformers used on the transceiver board. Full-sized photos complement the drawings, so you won't install a wire in the wrong place. I found the photographs especially helpful when soldering the thumbwheel to its small PC board. If you get this part on backwards (and that would be easy to do) it would be almost impossible to fix. The photographs show exactly how it's installed on the thumbwheel.

But, even with the manual as good as it is,

there were several spots that confused me. Watch carefully the placement of the IC sockets on the transceiver board. The control relay IS mounted in a socket.

Also, I would like to have seen the step-by-step assembly instructions moved from the back of the manual to the appropriate area in the text. For example: The synthesizer board starts on page 3-1, but the check-off list for parts begins on the very last few pages. I had to flip back and forth between the steps up front and the parts check list in the back.

The manual has a very good section on theory of operation on both the synthesizer and the transceiver boards. It's well worth your time to read though these chapters. There's even a chapter on soldering!

There are also several pages on troubleshooting the rig. I would like to have seen an overlay of the PC boards, with transistor voltages listed, to help track down problems.

Alignment and Tune-Up

Although you can align the ARK 40 without fancy test gear, it would be worth your while to have a frequency counter and perhaps a scope, too. A good DVM is required, as is a power supply capable of 2 amps. A wattmeter and a 50 ohm dummy load will be required for tuning the transmitter. Alignment is very simple and straightforward. You simply check for the proper operation of the translation oscillator and the loop oscillator. A counter is best here.

The transceiver PC board requires minor tweaking to get it to operate. There are only two coils to adjust and two small trimmers to tweak. Again, a frequency counter would come in real handy to set the BFO frequency.

Sometime the Dragon Wins

The tune up went smoothly until I reached the transceiver board. The receiver showed no life at all. I could hear my test signal in the speaker, but that was all she wrote. After doing some rough tests, the receiver's mixer seemed to be dead. The audio chain worked and all the inputs from the synthesizer were there. But a call or two to S & S Engineering brought a quick solution to my troubles. Several areas were pinpointed and I went back to the workbench armed with new knowledge.

After a bit more looking I found the problem. It turned out to be a super-thin sliver of copper on the PC board on one of the pads touching the ground foil, shorting out the input to the mixer. The pad is sooooo close to the ground foil that during the board's etching process a tiny piece did not etch away. A sharp knife cut the sliver away from the ground trace. That fixed the receiver and I was golden. Give S & S Engineering an "A" for support.

I notified S & S Engineering about the sliver and they promptly checked all in-house kits for the problem. No others were found, but this shows the attention this company pays to customer service.

On the Air

Operating the ARK 40 is, by design, simple! With only two controls, volume and RIT, you select the frequency you want with the push-buttons, then transmit. It really is that simple. Oh, but it does take some getting used to pushing buttons to change frequency, instead of twisting a knob. I found moving the 1 kHz button up and down the best way to hunt for stations. The buttons are small, and it's easy to go past what you want to tune in. After awhile, tuning with the push-buttons kinda grows on you. However, the ARK 40 is a not a contest machine.

This is the only QRP rig in the home-brew club that will allow you to QSY up or down the band with any precision. If you're asked to move up 2 kHz, you can! You can plan a schedule with a buddy back home while you're out in the field and not worry about mistuning the frequency. If you agree on 7.0335, that's exactly where you can go. There is no guessing as to what frequency you're on. It's amazing how stable the receiver is. The ARK 40 does not drift, thanks to the synthesizer. It genuinely is "rock-solid." Of course, some will say even a synthesized rig drifts. That's true, but you would never notice unless you broke out the test gear on the ARK 40.

The MHz digit does not appear on the front panel. So, to "push up" 7.040 MHz, the front panel buttons would read "0400." If QRM is getting rough, then flip on the audio filter. Adjust the RIT to center the signal into the filter, and that's it. The RIT is very smooth and allows you to fine-tune the signal right into the center of the filter. The QSK keying works very well. However, the relay is a tad on the loud side.

Every station I worked commented on the nice CW tone. The ARK 40 keys very well. The sidetone is pleasant to listen to, even after a long-winded CW contact.

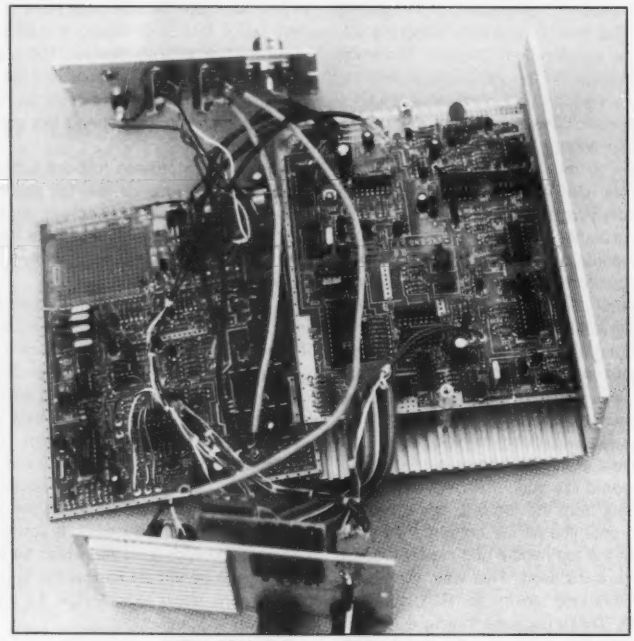
The front end keeps most unwanted signals from creeping into the receiver. The matched crystal filter did an effective job on the 40 meter band. Signals seem to pop out of the air. Switching in the audio filter proved useful in pulling stations out of the QRM 90 percent of the time. The ARK 40 sounds so good on receive that I leave it on all the time.

The ARK 40 would be quite happy at home or in a backpack. On receive, it draws 380 mA and my unit produced a fat 5 watts at 1.12 amps. The supply voltage is 13.8 volts. Of course, on a 12.5 volt battery, you'll get a little less RF output. You could run the ARK 40 with one or two 7 amp/hour gel batteries in the woods. A small solar panel is all you would need for long-term use in the field.

With its extruded aluminum case, the ARK 40 is military-grade solid. One would have to try hard to damage it. In fact, had the front and rear controls been waterproofed, I'd take it white water rafting and leave the baggies at home.

So what's the bottom line? The ARK 40 is exactly what the QRP enthusiast (or any ham, for that matter) needs: a simple-to-use monoband rig. S & S Engineering provides you with a rig that produces enough kick to make contacts with less than perfect antennas, while providing the luxury of a fully synthesized transceiver. If you enjoy building kits and like operating with today's technology, you can't go wrong with the ARK 40.

What I would like to see next is a small antenna tuner and switching power supply in the same size case as the ARK 40. A pipe dream? Perhaps, but then who knows? 73



The ARK 40 is not a kit for beginners.

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Amateur Radio and Amateur Solar Astronomy

There's going to be an annular solar eclipse on 10 May 1994. Solar eclipses are spectacular astronomical events in which the moon passes between the earth and sun, temporarily blocking the sun's rays from reaching earth. For a few minutes, the swath of the earth along the eclipse path is bathed in darkness. A total eclipse occurs when the perceived diameter of the moon is such that the sun is totally covered, except for the corona. An annular eclipse, such as the one next May, occurs when the apparent diameter of the moon is smaller than the sun, leaving a ring of light hanging in the sky. Radio propagation is affected by the solar eclipse because, for a brief period of time, the source of energy that causes ionization is interrupted so the average electron (e-) density changes. The e- density in the F-layer determines the maximum usable frequency (MUF), while the e-density in the D-layer determines the lowest usable frequency (LUF). Figure 1 shows the path of the annular eclipse that will be seen next May . . . note the times are in U.T. (i.e. GMT or "Zulu" time).

What Kind of Ham Experiments Can Be Done?

A review of the amateur radio literature shows that a number of formal experiments and observations have been performed during eclipses over the years. As you will see, there's plenty of real science that you can do with your radio.

Schellenbach (1970) describes observations made on the 40 meter ham band during the eclipse of March 7, 1970. He erected a 1λ horizontally polarized wire antenna that had four main lobes spaced at 54 degrees from the wire. The antenna was erected at a height of λ/2 in order to place an elevation lobe at about +30 degrees to optimize D-layer observations. Schellenbach observed a 25 kHz portion of the 40 meter band, working stations and observing signal level changes as the eclipse passed over the land.

Another observation of the 1979 eclipse was reported by Kennedy, et al. (1972). This experiment was performed on the 75 meter amateur band, using CW emissions. Stations 190 km apart arranged to use identical special transmitter keyers that would produce a two-second signal on 3,570 kHz every four seconds; the two stations alternating sending signals to each other. The receivers of the stations had the automatic gain control (AGC) function turned off. Output levels were measured with an AC multimeter connected across the speaker connections. As a precaution against ground wave contamination of the data, the antennas of the two stations were oriented end-to-end, so ground-wave signals would be off the nulls of the antennas. The data collected consisted of groups of 10 two-second transmissions, spaced four seconds apart, at intervals of one to two minutes. The 10 pulses in any one group were averaged, and the averages of the groups were compared. A maximum signal change of 17 dB was noted. The two stations took data for a week prior to the eclipse in order to establish a normalized data set.

Menzel (1976) discusses potential observations of the effects of the eclipse of 23 October 1976 on propagation in the upper HF region, i.e. the 10 through 20 meter amateur radio bands. It was noted by Menzel that during the period of the eclipse there would be a brief return to nighttime propagation conditions for communications paths along, and either side of, the eclipse totality path. This same type of observation is open to shortwave listeners (SWLs) as well as ham operators. The ham operators have a definite advantage, however, because they can schedule contacts with stations in the regions of interest, and don't have to await stations of opportunity to appear. Like Kennedy, Menzel recommends that amateur operators set up schedules for a week prior to the eclipse, at the same time of day, in order to establish a baseline of signal level averages. Otherwise, the measurements made on the day of the eclipse would be less usable.

Johnston and Johnston (1979) performed radiosolar observations of the 26 February 1979 eclipse that crossed the northwestern United States and the western provinces of Canada. They were part of an experiment that used the 75/80 meter band. A set of 12 stations participated, six transmitting in rotation on a two-minute schedule, and six monitoring the others. The transmitting stations sent a five-second identification (callsign), followed by a two-second quiet period to establish ambient noise level, and then held the key down for 12 seconds to establish signal levels.

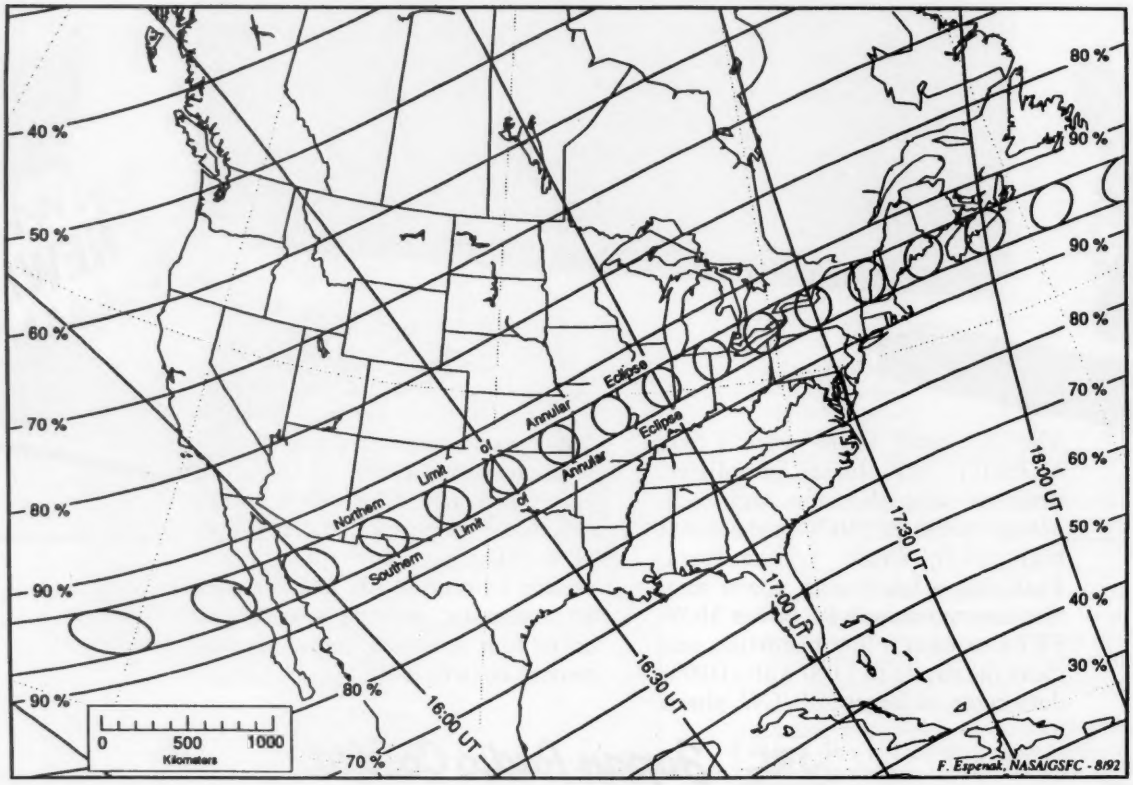

Figure 1. Path of the solar eclipse (from a NASA publication).

Receiver S-meter readings were used to establish levels. They observed the effects for three hours, keeping time records in universal coordinate time (UT) through radio station WWV transmissions.

An alternative to using amateur transmitting stations was reported by Smith (1979). He used observations of WWV and several 50 kW AM broadcast band stations to study the propagation effects of the eclipse.

Lewis (1979), in a report preceding the 1979 eclipse, reported on his own literature search. He reported that a Canadian team of scientists at Fort Churchill, MB observed the 20 July 1963 eclipse. In that event, 94 percent of the solar disk was covered. The Canadians used sounding rockets sent to an altitude of 200 km to measure electron density, temperature, ultraviolet and X-radiation. They found that the e- density in the D-layer dropped proportionally to the percentage of the solar disk eclipsed, starting within approximately three minutes. In the E and F1 layers, however, it was found that the e-densities decreased but it was NOT proportional to the percentage of eclipse. The team believes that this nonlinearity is due to the fact that X-radiation is emitted largely by the sun's corona, which is not eclipsed. Such radiation is largely attenuated by the time it reaches the D-layer, so the effects in that region are more linear.

A group in Urbana, Illinois, USA, used a 2.66 MHz ionosonde instrument to observe a 60 percent eclipse on 10 July 1972. They noted a large decrease in e- at distances of 75-80 km.

Australian researchers observed the eclipse of 23 October 1976 (see also Menzel 1976, above). The Australian observations measured the angle of arrival of 2.5 MHz signals from a station 69 km away. They noticed a "... pronounced oscillating tilt" of the E-layer at 100 km, which lasted some 40 minutes.

Some General RadioSolar Observation Advice

When looking for shortwave fadeouts from SIDs, take advantage of the fact that absorption varies with the square of the frequency (F2), so observations should take place on a frequency as close as practical to the MUF for that day. Estimations of the MUF can be gleaned from the propagation prediction columns in amateur radio and shortwave listener monthly magazines, or from the MiniMUF software.

For eclipse monitoring, use frequencies that are most affected by the D- or E-layers of the ionosphere. Lewis recommends using frequencies that are most affected by D-layer, so he prefers frequencies in the 75/80 meter band, or near 5 MHz. He claims that the greatest signal enhancement will occur just before totality reaches the receiver observation site.

"Observing solar eclipses by eye can be very dangerous! Don't look directly at the eclipse, even briefly. Indirect methods can be found in amateur astronomy books."

WARNING!

Observing solar eclipses by eye can be very dangerous! Don't look directly at the eclipse, even briefly. Indirect methods can be found in amateur astronomy books. Every time an eclipse occurs, it seems that we hear stories of people who look directly at it, only to have the image burned into their eyesight forever. And if they use a telescope or binoculars to look at the eclipse, then immediate destruction of the eye-sight will occur. If you absolutely MUST look at the eclipse, consult an opthalmologist for advice on methods and materials that will save your eyesight.

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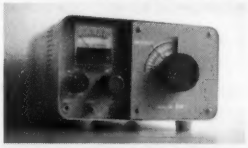

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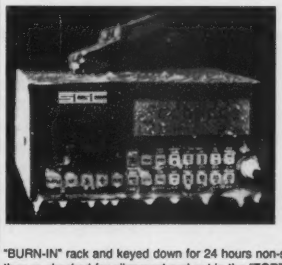

The SG2000 HF transceiver is type accepted for commercial and marine service made with traditional U.S. commercial radio quality (and of course it can be used on the ham bands also). While the Japanese radios have 2 final transistors that strain to put out 100 watts on the low bands and only 75-85 watts on ten meters, the SG2000 has 4 large transistors that loaf along at 150 watts on ALL THE BANDS INCLUDING 10 METERS! Some of the SG2000 features are: 1) A control head remotable (no special kit necessary) up to 150' away from the rig, perfect for automobiles and boats. Up to 8 heads can be utilized and used as intercoms also. 2) The largest display of any HF transceiver. 3) 644 preprogrammed memories and 100 user programmable memories. 4) operable from -50F (-45C) to 185F (+85C). You want quality right? Here is what EVERY SG2000 must endure before they're shipped from the factory: 1) They're factory aligned, 2) EVERY SG2000 is keyed down at full power (CW 150 Watts) into an open antenna for about 10 seconds, then connected to a shorted antenna and keyed down for an additional 10 seconds. 3) EVERY SG2000 is put in the "BURN-IN" rack and keyed down for 24 hours non-stop at full power CW. Don't try that with the foreign radios. 4) EVERY SG2000 is then re-checked for alignment and put in the "TORTURE RACK" where they are keyed on and off every 10 seconds for 24 hours. 5) The SG2000 is then re-evaluated and all control functions are verified to ensure that the microprocessor is up to spec. THEN AND ONLY THEN IS THE SG2000 ALLOWED TO LEAVE THE FACTORY.

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Getting Started with TCP/IP

[This series of articles explains how to set up a working amateur TCP/IP station. This first installment will sell you on the idea; next month we'll get started with the software itself. The software needed is all available free from many sources (reliable ones will be listed where available). Much of it will be available from the 73 BBS (603/924-9343), though those of you with access to Internet FTP are much better off using it when possible. Some of this first installment is a review of things you may have seen before—for this I apologize. I wanted to be sure that the series was complete.]

So many of you have written—by paper mail and electronically—asking about TCP/IP and ham radio that I have decided I had better write something about how to do it before you start showing up at the door. This series of columns is designed to give you an introduction to TCP/IP over radio, and some how-to-do-it information. The BEST way to get started in TCP/IP is to find someone who is already using it, but I'll do my best to explain the ins and outs to the shy and isolated out there.

What is TCP/IP?

TCP/IP (Transport Control Protocol/Internet Protocol) is a networking scheme developed by ARPA (The DoD's Advanced Research Projects Agency) to make possible the huge collection of computers, cables, routers, and all sorts of other boxes known as the "Internet." The Internet (note the big "I"), is worldwide and carries a mind-boggling amount of data each day. Nearly every university, large company, small technology company, and government agency is connected to the Internet.

Amateur radio is also connected to the Internet, and amateurs worldwide use the resources available there for communications and database services. In fact, as amateurs we have our own network: 44.xx.xx.xx. Any IP address starting with "44" is some sort of amateur station. (We'll look at how addressing works later.) This 44.xx.xx.xx network lets amateurs send mail to (and connect to) stations all over the world. Internet-based services such as the Ottawa converse bridge—which allows real-time chat among hams from all over the world—and the Call Sign server at SUNY Buffalo—containing up-to-date callsign records for all US hams—count on the landline connectivity of the Internet to bring you their services.

Some amateurs will tell you that TCP/IP is not ham radio because it uses landline-based resources. To these self-appointed guardians of the ether I say, "Phooey." (Pretty eloquent, eh?) If you don't like it, don't use it—but leave those of us who want to move into the 20th century alone. Those of you running full-service PBBSs take note: The Internet moves packet traffic—fast! More and more stations acting as gateways from the landline-based Internet to the various radio LANs across the country mean fast, error-free routes for your forwarding, if you know where to tie in.

All of these resources and more, are available through the TCP/IP *protocol suite*. TCP/IP is a *protocol*—a set of rules—by which communications of various types can be accomplished. If you are familiar with the idea of "diplomatic protocol"—the set of rules that govern the behavior of government representatives dealing with each other—then you have some idea of what I am talking about. With TCP/IP, stations have a way of contacting each other, establishing a communications channel, and packaging data for transmission.

What About Amateur TCP/IP Over Radio?

In 1989, Phil Karn KA9Q released a program called NOS to the ham community. This program was a first attempt at implementing TCP/IP for use on IBM-PC compatible machines for use over radio. It was—and in many respects still is—an experiment. KA9Q's NOS still provides the *kernel*—a technical term for the heart of an operating system—for the various implementations of TCP/IP hams use today. Since Phil provided the source code to NOS, many ham programmers took the torch and began to develop variants. Today, the resemblance to the original can be remote, but we owe thanks to Phil for his original work—it started a revolution.

Two things make TCP/IP a very powerful networking scheme for amateur radio. One we have already discussed—the wealth of the Internet. When we use TCP/IP over the air, the use of the landline-based Internet resources is automatic and transparent—like going to a cafe in France and ordering in French. The other is the protocol itself. TCP/IP is based on the idea of services. Each of its various features is a *service*, and is accessed through a *port* or *socket*. This arrangement makes everyone both a client (user) and a server (provider) if they want to be.

TCP/IP Services

There are four services which amateurs will find themselves using most frequently. These provide ways of connecting to other stations and transferring data. These services are the same no matter how you get to them—phone line, Ethernet network, or radio.

Telnet

The telnet service is the workhorse of the TCP/IP environment. Telnet allows a client to start a terminal session at a remote server across the network. In other words, you can login to a remote machine—wherever it happens to be—if it is reachable from your network. In the ham community, telnet is generally reserved for accessing database servers and the like. (See Figure 2 for an example. Telnet was used to reach this Internet resource.)

Telnet can also be used to login to another ham's station in order to use the mailbox there or other resources that might be provided. To continue the call server example, some NOS implementations now support CD-ROM-based callbooks. This could be accessed via telnet.

FTP

The File Transfer Protocol Service allows clients to download or upload files (binary or text) from an FTP server. This is an interactive system and allows the client to change directories, list them, and select file(s) to receive. Batch downloads are supported. If you have tried to download files from an AX.25 station you know it can be frustrating. FTP works like a charm. Recently, a friend downloaded about a quarter of a megabyte of files from my machine—at 1200 baud—in about an hour.

Finger

The finger service allows a client to get information about a particular system or user. The command:

```
Conference @ IndianaU  Type /HELP for help.
/w
User    Host        Via     Channel  Time    Personal
n1ewo   IndianaU            0        0:12   Jeff in Franklin IN
pe1mvj  westland    Ottawa   0        0:12
n8rhv   Detroit_MI  Ottawa   0        0:10
ve3wzs  TorontoBBS  Ottawa   0
n5uhb   LasCruces   Ottawa   44       0:07
n8fkv   Detroit     Ottawa  5729      0:01   Ken in Livonia, MI
dg3mkc  westland    Ottawa  5729      0:00
dl3ned  westland    Ottawa   0        0:00
n8lfj   Detroit     Ottawa  5729      23:56  Ian - Livonia,
                                             Michigan
ke8mk   Detroit_MI  Ottawa   5        23:54  Frans Rochester
(STBY ON7KO)
k5di    LasCruces   Ottawa   44       23:54
vk3azq  OzHub       Ottawa   0        23:52  Peter Melbourne
                                             Australia
wb6jkw  Detroit     Ottawa   0        23:51
ve3tle  TorontoBBS  Ottawa   0        23:49
n8taq   Detroit     Ottawa  5729      23:48  David in West
                                             Bloomfield MI
n5faz   LasCruces   Ottawa   44       23:45  paul el paso, tx
vk4knt  Brisbane    Ottawa   0        23:37
wb4hin  Ottawa      Ottawa   0        23:35
aa5df   LasCruces   Ottawa   44       23:32  Tim doing homework
ve3kpb  TorontoBBS  Ottawa   44       23:18  Paul in Oshawa
ve3uzg  Vancouver   Ottawa   0        22:48  Art in Ottawa
kb9fus  BBS@k9iu.ampr.org
***
<ve3wzs>: Is anyone receiving my msg? I have just registered as
a user & not
quite sure
<ve3wzs>: how things work.Mike VE3WZS
<ve3uzg>: rgr 3wzs, copy in Ottawa..
```

Figure 1. A typical Sunday afternoon on the converse bridge. It's very late in Europe, or you would see more stations from there. Thanks to the Internet, local converse bridge programs from all over the world are linked together in a big party line. See the text for more.

```
*** connected to 128.205.32.2:2000
Callbook v1.3  Bug reports to bowen@cs.buffalo.edu  Type
'help' for help
>> call w2nsd
Call-Sign: W2NSD                  Class: ADVANCED
Real Name: WAYNE GREEN II         Birthday: SEP 3, 1922
Mailing Address: WGE CENTER, PETERBOROUGH, NH  03458
Valid From: AUG 11, 1987          To: AUG 11, 1997
```

Figure 2. The Call Server at SUNY Buffalo provides up-to-date callsign information. Here we look up an obscure callsign to test the database. This is one way amateurs take advantage of landline-based networks. See the text for more.

finger n1ewo@k9iu.ampr.org

will cause the client machine to connect to the finger server at K9IU and make an inquiry about N1EWO. K9IU will then return an informational message about the user N1EWO, providing an informational message whose content is dependent upon K9IU's configuration.

Finger can also be used to provide other sorts of information. For example:

finger weather@iugate.ucs.indiana.edu

returns a weather report for Central and South Central Indiana.

Converse

This service is VERY popular. You can see an example screen from the Ottawa converse bridge in Figure 1. The converse bridge can be a local service, or it can be *linked* with other bridges over whatever comm link is available. This service is a great deal of fun, and can be truly useful for emergency nets when administered properly. (Those of you who have Internet connections already will find the bridge at 44.135.96.7 3600. You must connect from the amateur net: 44.xx.xx.xx. Connections attempts from any other net will be ignored.)

Yet Another Service . . .

One more service to mention is called SMTP (Simple Mail Transfer Protocol). Through SMTP, amateur stations can forward their own mail! No more need to login to some remote station and read your mail; SMTP and its cousin POP (Post Office Protocol) will allow every ham to be his own postmaster.

SMTP will automatically forward, through a specified route, any mail addressed to any amateur it knows. It happens transparently, and so easily it seems like magic. With SMTP, you create the mail ON YOUR MACHINE. That's right, you don't login to another machine—you use your own. That is the way things *should* work.

POP is an alternative to SMTP and makes sense for those who cannot dedicate a machine to running TCP/IP all the time. Like SMTP, POP allows you to use your machine to create messages, and will route them automagically. Unlike SMTP, though, POP calls a post office (another system on your network) and uses a batch technique to send and receive messages. This way, you can check for mail at your post office whenever you start up your system.

Once again we are in France speaking French—these two protocols come from the Internet, and so work perfectly across it and with the machines on it. This means that Internet resources, like list servers which automatically route messages to special interest groups, are available the ham.

"If you don't like it, don't use it—but leave those of us who want to move into the 20th century alone."

OK, OK, I'm Convinced—Now What?

I told you this was a series of articles, and that I would help you get started, so here it is. We will be working with a piece of software called JNOS. This is a variation of KA9Q's NOS, and is available from several sources. The version you will need is 1.08c. I chose this software for several reasons, and there will be those who will argue that it is not the best choice. Here are some of my reasons:

1. It is stable, and still a "live" product. Johann WG7J is still working furiously on new versions, so it will grow as TCP/IP does.

2. It has a decent user interface, but also provides everything that you need to run a full-service PBBS. This way I can help both the PBBS operator *and* the average user to get started.

3. I like it, I use it myself.

So, to get started you have to have the software. Those of you who have Internet FTP access will find the program at uscd.edu for anonymous FTP. Those who do not will find it on the *73* BBS, in the packet files area. You will also find the program on ham BBSs around the country. Remember, you want version 1.08c. You will also need a TNC that will operate in KISS mode. If you are unsure of your particular TNC, check the manual. Those of you running BayCom (or equivalent) modems *may* be able to run JNOS with a special driver. If you want to try, mail me and I'll explain.

Your homework is:

Get version 1.08c of JNOS.

Get a valid TCP/IP address. To do this, contact your local ampr coordinator and ask for one. If you need to find out who your coordinator is, send me mail at either:

Internet:
jsloman@bix.com
or
packet:
N1EWO@NØARY.#NOCAL.CA.USA.NOAM

Next month, we'll look at how to set up the software and get that TCP/IP stuff working. 'Til then, 73 de N1EWO.

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More on the Amiga

I have been taken to task. I admit it, and I accept the criticism, and I will tell you all about it.

In July, I related the remarks of a ham who told us about his "friend who is a confirmed satellite QSOer. This guy has very elaborate radio equipment, but is using a C-64 for tracking and decoding. Until now, the bit rate has not exceeded 1200 baud, so he has been able to get away with a C-64. Soon, however, things are going to change. The new packet satellites will operate at 9600 baud, and my friend will have to change computers.

"This person will not use a computer for anything other than amateur radio. Therefore, I would like the changeover to be as inexpensive as possible. Is it possible that a Commodore 128 could read and write ASCII at 9600 baud? If this were possible, I believe that he might be able to continue to use his disk drive and printer.

"I feel certain that an Amiga A500 could do it, but I hesitate to recommend a computer which is now an orphan. Please roll this around and let me know what you think. Perhaps there are readers of the column who are facing the same choice."

In my response, I indicated that a PC clone would be a good choice. One of our readers, who wishes his name not be printed, is upset with our "lack of knowledge about Amigas."

"First of all, the Amiga is most definitely NOT an orphan, not even the A500. There are upgraded machines and an improved operating system. Because of the Amiga operating system's construction, NONE of them have been orphaned. The new AGA (Advanced Graphic Architecture) models are the Amiga 1200, and the Amiga 4000, which Commodore has just spent millions to develop. The older models are the 500, the 2000, and the 3000. Ask the video industry about the Video Toaster . . . they will be surprised to know that the Amiga is an orphan, which is what your column implied. Almost all software that is written for the new Amigas will work on the older models, including terminal programs, ham radio software, graphics software, etc."

He goes on to elaborate on published reports of the "death" of the Amiga which, as with the case of Mark Twain's death, are apparently exaggerated. All in all, he makes a strong case for the Amiga as a capable machine, with a mature multitasking operating system, and a plethora of features built in.

Now, I would like to point out that it was not I who called the Amiga an orphan—I was quoting a reader, much as I quoted our Amiga supporter this month. As to why I have not written more about the Amiga to date, I have heard precious little about it from the readers of this column. Wayne has mentioned the Amiga in his editorials, including the Video Toaster.

I looked back over the last few years of "RTTY Loop" to see just what coverage the Amiga has received. In March 1988 I printed a simple terminal program for the Amiga. In August 1988 a copy of a public domain program for the Amiga was offered for a blank disk and a mailer, through another reader. November 1989 brought the note that "Amiga users are also on the rise, with Amiga Users Nets on 10 and 75 meters, as well as a number of Amiga users on 20 meter AMTOR." Another user was highlighted in March 1990 with the comment that "hams using Amiga computers seem a bit more versed on the intricacies of this mode." A listing of shareware and commercial RTTY programs for the Amiga was given as well.

So, look'it. I have not ignored the Amiga. For that matter, if you look back in this column, I have not ignored much. How much coverage I give to a given system is directly proportional to how much input from the readers, and even from manufacturers, I get. So, stay tuned, be vocal, and let me hear from you!

Other Questions

Here's a question, for example, from George Lemaster WB5OYP of Falls Church, Virginia. He wonders where one can get a diagram for the Dovetron adjustable filter RTTY demodulator, model MPC-1000T. Somehow, I am sure that some reader, somewhere, can help out.

He also asks about the HAL ST-8000 spectrum display. He'd like to make a scope display which would give an indication of the modulation frequencies and/or FSK type modulation. Once again—anybody?

Finally, here's another request for help, this one from the other side of the globe. Michael Mihailovic VK2OZ in Sydney, Australia, tells of his recent acquisition of a 1984 vintage Kantronics Universal Terminal Unit. He needs help finding a terminal program to run the unit, one with transmit buffers and a type-ahead facility. He wonders if anyone is still using this decade old unit.

He also relates that although he has the operator's manual, he is missing the "Introduction To and Operation of AMTOR" book that originally came with the Kantronics UTU. He would like to have this book to get onto AMTOR, but is having no luck locating a copy. Kantronics told him, he says, to contact a local Australian agency, which had no idea what he was talking about. If a copy of this book, one would presume even a photocopy, is lying around, this is one amateur who would be very grateful. I would be happy to forward any such material to him, and look forward to hearing from you, out there, who can help.

One of the programs in the RTTY Loop Software Library may well be at least the software answer to Michael's problems, or even yours. The collection continues to grow, with three disks of RTTY/ham software and one of archiving utilities. I try to always include the latest versions of programs available, so even some of the basic disks are subject to updates. A self-addressed, stamped envelope, or an Email note, will get you a listing of all the programs and disks. Each collection pretty well fills a 1.44 Mb disk, and is available for $2 per disk to be filled, sufficient blank media, and a self-addressed, stamped disk mailer for return to you. As always, Email to me on CompuServe (ppn 75036,2501), Delphi (username MarcWA3AJR), or America Online (screen name MarcWA3AJR) is the quick and easy way to reach me. Postal service hard copy to the above address is fine, too. Just be sure to enclose a self-addressed, stamped envelope if you would like a personal reply. If you would like to put your two cents in, and don't want your name printed, that's fine too, as long as you tell *me* who you are! I won't print or pay much attention to an anonymous letter, but I will respect your request for privacy if you like. Above all, write me! This column reflects the interests of its readers, and I read those interests through your letters. I look forward to hearing from you. 73

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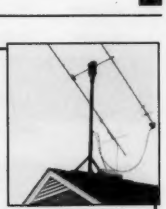
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Foxhunt Fun at the Friendship Games

"An unstable weather pattern is returning to southwestern British Columbia." The weather radio voice coming from my wife April's scanner was discouraging as we awoke on Wednesday, June 23, our first full day in Victoria. Summer showers are the rule rather than the exception on the western Canadian coast, but we were hoping for better conditions for the 1993 Friendship Radiosport Games (FRG-93), just two days away.

Heavy rain had pounded our rental car as we waited for the ferry from the mainland to Vancouver Island the previous day. Such a storm during the FRG-93 radio direction finding contest (the foxhunt) would not be welcome.

To the green-thumbed residents of Victoria, abundant rain makes this provincial capital a perfect place to live. Flowers are everywhere. You see them on lawns, in gardens (called "rockeries") and hanging in uncountable numbers of baskets. We admired them as we made a get-acquainted trip to Thetis Lake Park, the foxhunt venue. We then drove to the Carey Road campus of Camosun College, where special events station XO7G had been active for several weeks.

Station Manager Al Fast VE7XZ was proud of XO7G, but April and I wanted to visit another of his hamshacks that is just as special. After a short drive we arrived at XO7GRH, in the rehabilitation unit of Gorge Road Hospital. Al introduced us to two of the patients who put this station on the air regularly using voice, CW, and packet.

Like other stations in Victoria, VE7GRH was using the special XO7 prefix made available for the Friendship Games. Al and his friends had installed special adaptive equipment such as oversize switches, voice-readout rotor controls, and puff-sip keyers to make this station accessible to anyone, even those having no use of their arms and legs (Photo A).

The Mini-Summit

Now it was time to begin last-minute preparations for the Games. We had been invited to the home of Perry (VE7WWP) and Anne Creighton to dine and to finalize rules and procedures for the FRG-93 foxhunt.

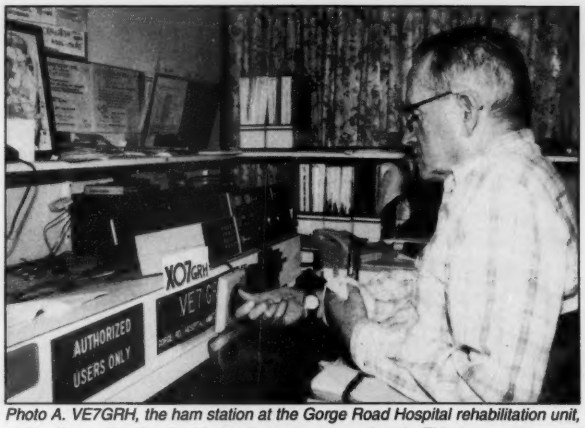

Photo A. VE7GRH, the ham station at the Gorge Road Hospital rehabilitation unit, makes it possible for disabled patients to get on the air. This is one of several operating positions.

"It's only a couple more places at the table," Perry told us, referring to his current house guests, Evgeny Stavitsky UWØCA, wife Olga, and interpreter Raisa Kucheryavenko UAØCJO. Evgeny is president of the Friendship Amateur Radio Society (FARS) chapter in Khabarovsk, Russia. He led the 15-member Russian delegation to these biennial Games.

Raisa is not only excellent at her translating duties, but is also a superb conversationalist in her own right. Anne insisted that all radio talk be postponed until after dinner, so we spent two delightful hours getting acquainted and learning about our respective lifestyles.

After dessert, we got down to business. Although Perry had never entered nor witnessed a ham radio foxhunt, he had agreed to organize this event, as Vice President of the hosting FARS Victoria chapter. Evgeny represented the Russians, and I represented Foxhunt Team USA.

We agreed to follow the International Amateur Radio Union (IARU) guidelines for foxhunting championships as

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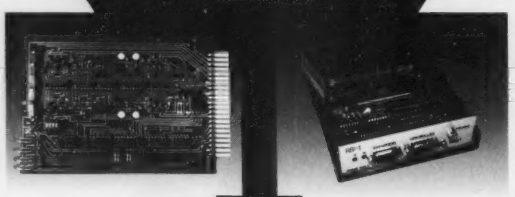

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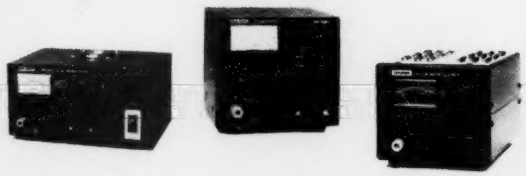

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closely as possible. This 12-page document calls for five "foxes," transmitting in sequence for one minute each. Contestants attempt to locate as many as possible within three hours, carrying a card to mark with the unique punches located at each fox.

Scoring is determined primarily by the number of transmitters found, and secondarily by elapsed time. Contestants are individually timed. They start at five-minute intervals, each coinciding with the start of fox #1 transmissions. This scatters the contestants on the course to minimize "follow the leader" problems.

Successful foxhunters pay attention to the bearings of all transmitters at all times, plotting them on maps provided by the organizers. They also eye their watches, since exceeding the three-hour time limit means disqualification. In other words, it is better to return after 175 minutes with only one fox found than to find all five in 185 minutes.

Each country may field one or more teams of three to five contestants each. Team score is a function of the best three individual scores. Team members are not allowed to help one another on the course. In addition to team medals, corporate sponsor Advanced Electronics Applications provided medals for the top three individual entrants.

IARU rules for foxhunt championships call for separate categories for seniors (males 18 to 40 years), juniors (boys under 18), women (any age—nobody asks!), and "old-timers." Only seniors are required to find all five transmitters in IARU European/Asian events; others need find only four. Because there was only one junior (Photo B) and two women (Photo C) among the contestants, we agreed that there would be no special categories in FRG-93. Everyone must attempt to find all five transmitters.

The Russians fielded two teams of

Photo B. Ben Young VE7AJT, the youngest competitor, has just found his first fox and is looking for #2 with one of the Japanese RDF sets.

Photo C. Svetlana Boltenkova UAØCNE, one of two YLs participating in the foxhunt, leaves the starting corridor. She used a three-element Russian RDF set.

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Photo D. At the Sunday demonstration, Evgeny Stavitsky UWØCA shows a blindfolded ham how to get a bearing with a Russian two-element RDF set.

Photo E. Leading Russian team #1 to the foxhunt gold medal were (left to right) Igor Krivosheev UAØCZ, Mikhail Zavarukhin UWØCN, and Alex Savin UAØCDX. They accepted the award at the Saturday night banquet.

four members each. The three-member Canadian team was joined by Yoshiko Yamagami JQ1LCW, the only participant from Japan. Kevin Kelly N6QAB, J. Scott Bovitz N6MI, and Randy Seybold K5TTE competed from the USA.

By the time our rules were finalized, it was getting late. After the traditional toast of Russian vodka to seal the agreement, it was time to go.

Testing . . .

Perry was admittedly no foxhunt expert, but he had obtained expert assistance. He had called the VictOrienteers, who hold regular outings in Thetis Lake Park. Alan Philip, one of the organization's leaders, volunteered to help, and brought several other members for timing and Course Marshall duties. No one knows the park better than Alan, who was chief cartographer of the beautiful 1:15000 topographical map supplied to the contestants.

At orienteering events, contestants navigate their way through unfamiliar wooded terrain using only a topo map and compass, looking for previously placed controls (red and white flags) at locations marked on the map. Radiosport foxhunting is similar to orienteering; locations of flags coincide with the fox transmitters. (But foxes aren't marked on the map, of course!)

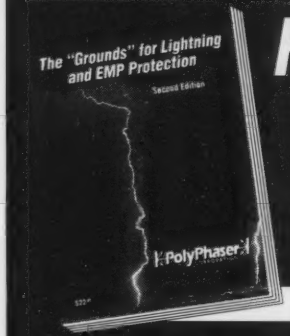
Alan had suggested five fox sites, which we tested Thursday. Total distance around the course would be 4-1/2 kilometers. That's not easy, but it's much less than the 12 km courses common in European championships.

Evgeny UWØCA and April WA6OPS stayed at the start/finish point with radio direction finding (RDF) gear as Perry, Alan, and I carried a test transmitter around the course, braving occasional bouts of rain. At each of the five sites, we determined the power and antenna configuration needed to give adequate signal to the starting corridor.

Southern California T-hunters (N6MI, N6YKE, and AF6O) supplied the five course transmitters and endpoint homing beacon. All used N6MBR TBOX boards (see "Homing In" for October 1991) for perfect synchronization.

RDF Equipment: The Scapegoat?

Everyone agreed that the 1991 FRG foxhunt course in Portland, Oregon's Forest Park had been very difficult. Only seven contestants out of 16 found all five transmitters. The Russians felt the RDF sets supplied by FARS-Portland were partly to blame.



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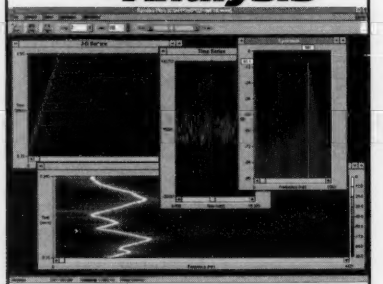

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The Russians volunteered to provide the competitors' RDF sets for FRG-93. They brought 10 receivers (model Altai-145) from the Barnaul Radio Factory in their country. Altai receiver circuits are cleverly built into the boom of two- or three-element beam of flexible steel tape for safety in the field. There is an AM detector (which also works on FM signals) and a pseudo-BFO that serves as an audible strength indicator for distance estimation.

Altai sets were available for all contestants to use, but some chose to use others. There were a couple of Japanese RDF sets with HB9CV two-element arrays and two of the TDOA units. Russian and Japanese hams have only 144 to 146 MHz on 2 meters, so course transmitters were modified to operate on 145.725 MHz. With no crystal or ceramic filter, the single-conversion Altai receivers are rather broad. But they worked well on this hunt, except for minor QRM from local packet operations on 145.69 MHz.

Gold	Alex Savin UAØCDX	2:07:10
Silver	Igor Krivosheev UAØCZ	2:27:00
Bronze	Mikhail Zavarukhin UWØCN	2:52:31

Figure 1. Individual medalists at the FRG-93 foxhunt and their times to find the five transmitters.

Gold	Russia #1	UAØCDX, UWØCN, UAØCNE, UWØCR
Silver	Russia #2	UAØCZ, RAØCE, UAØCKB, UWØCD
Bronze	Canada	VE7BFK, VE7AJT, JQ1LCW, VE7MAL

Figure 2. FRG-93 foxhunting championship teams and team members.

Banking Signals Off the Lakeshore

It was our intent that the 1993 foxhunt course be less arduous than 1991's, giving better scores. All foxes were placed near established trails in the southeast corner of the park. Contestants picking the proper 4-1/2 km trail loop would pass close to each one.

Foxhunt Friday brought perfect weather and no malfunctioning of equipment. But to everyone's surprise, scores were poorer than in 1991, overall. Only three competitors found all five foxes. The average was 2.1 foxes found per contestant.

The Russians were clear winners, though they averaged only 3.1 foxes each (Photo E). No doubt their familiarity with European/Asian-style foxhunting and the RDF gear gave them an advantage. But they are also in very good physical condition, when you consider that their team's average age is 40.

Hunters who didn't do well were probably victims of signal reflections again. This time, however, the bounces came from more distant points. The signal path from fox #1 to the start was unobscured, so most hunters found it. But the direct path from #2 and #3 to #1 was blocked by 200-foot hills.

Sometimes the signal propagated from foxes #2 and #3 by passing over a big lake to the west of the course or a marsh to the northwest, then bouncing off hills on the opposite bank to get back to hunters at the start or at fox #1. In such cases, the classic principle of RDF comes into play: "Your RDF set indicates the direction of incoming signal, which may or may not be in the direction of the fox." Often, it wasn't.

Hunters following reflected signals were drawn into the vast interior of the 2200-acre park. Perry says there is a nude beach somewhere on the lakeshore. I wonder if any of the contestants discovered it!

Try It Blindfolded

If North American hams are going to hold our own in future European/Asian style foxhunts, we must make them regular events here, to gain experience and to train future champions. To encourage the hams of Victoria, the Russians put on a demonstration Sunday at the FRG hamfest grounds.

To make it more interesting at this flat, treeless campus, attendees were invited to try finding a fox while blindfolded, using only the audible indications of a Russian RDF set to get bearings (Photo D). What fun—maybe this should replace transformer tossing and QLF (left-foot CW sending) contests at our summer hamfests!

Beautiful scenery, friendly competition, exercise, radio talk, and international goodwill—FRG-93 had it all. I could go on about the CW sending and the pile-up contest, the special events station, and the N6MI/K5TTE QRP Field Day in the park, but I want to leave room for plenty of photos to inspire you to add on-foot foxhunting to your club's RDF activities.

The hams of Khabarovsk, Russia, are hosting the next Friendship Radiosport Games in 1995. You're invited. It's not too early to start training. Let's win some medals and help bring the big FARS traveling trophy back to the USA! 73

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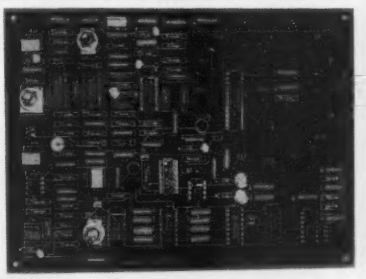

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NASA Resources

There is such a plethora of books, pamphlets, videos, and other resources out there for teachers to avail themselves of that it sometimes seems like an overwhelming task just to categorize and zero in on where to begin looking for needed classroom materials. With that in mind, I'm dedicating this month's column to helping teachers and instructors of amateur radio to quickly locate some of the resources that NASA has to offer.

With more and more schools participating in SAREX projects, the need for highly motivational lessons and materials about space travel and communications is becoming greater. Ever since my school's SSTV contact with Tony England WØORE on board the *Challenger* in August 1985, I've always included a unit on space and communications in my ham radio curriculum. The materials are always current and overlap very nicely into science and current events studies. My sixth-, seventh- and eighth-graders really love this portion of the curriculum, and it provides fabulous follow-up and enrichment activities in the classroom.

On March 2, 1993, NASA's education staff met with five aerospace education organizations for an overview of each of their programs and a discussion of how NASA can work with them in supporting NASA's Strategic Plan for Education. All five organizations have programs complementary to NASA and all support pre-college education.

1. For eight years now, *The Young Astronaut Council* has targeted students in the K-9 age group. The Y.A.C. supplies space-theme curriculum packages and a teacher's handbook for $40 annually. Chapters are often funded by community groups such as the PTA, Kiwanis Club, Civil Air Patrol, and Air Force Association. The Council now offers a "distance learning" program using satellite technology to beam space curriculum programming three days a week from their Spokane, Washington, uplink. The Council also recently developed curricula, specifically targeted to reach minority students, through funding from the National Science Foundation. For further information, contact The Young Astronaut Council, 1308 19th St. N.W., Washington DC 20036; (202) 682-1984.

2. *U.S. Space Camp*, a nonprofit educational organization, is open to students in grades 4-12, and to educators who may participate in graduate or in-service teacher training, workshops, and conferences. The main goal of Space Camp is to motivate students to study mathematics, science, and other high-technology subjects. More than 150,000 students have graduated from Space Camp programs since 1982. Space Camp tuition ranges from $450 to $750, excluding air fare. Scholarships are available in three categories: scholastic achievement, ethnic background, and financial need. For further information, contact: U.S. Space Camp, U.S. Space and Rocket Center, P.O. Box 070015, Huntsville AL 35807-7015; (800) 63SPACE.

3. The *U.S. Space Foundation* is a nonprofit educational organization promoting public awareness of America's space programs. It serves as a national resource for research and educational information on all aspects of space. The Foundation, in conjunction with the U.S. Air Force Academy, offers a five-day graduate level course, "Getting Comfortable Teaching with Space." Shorter in-service courses are also available in local school districts on request. Members of the Foundation's "Project First Step" designed an innovative middle school science curriculum using astronauts and other scientists as role models. For more information, contact the Foundation at 2860 S. Circle Dr., Suite 2301, Colorado Springs CO 80906-4184; (719) 576-8000.

4. The *Challenger Center for Space Science Education* is an international network of facilities and programs founded by the families of the seven crew members of *Challenger* flight 51-L to continue the crew's educational mission. Currently, 14 high-tech space simulators are located in science centers, museums, and school districts across the U.S. and Canada. The simulators fly middle school students through two-hour missions where they learn science and develop problem-solving and communication skills. The *Challenger* Center has developed a wide range of student and teacher programs, which are often led by members of NASA's "Teacher in Space Program." The Center also offers live international teleconferences. For further information, contact The *Challenger* Center for Space Science Education, 1055 North Fairfax St., Suite 100, Alexandria VA 22314; (703) 683-9740.

5. The *Astronaut Memorial Foundation* was established in the aftermath of the *Challenger* accident to honor all 16 astronauts who have lost their lives in the line of duty. The Space Mirror National Monument was established at the Kennedy Space Center by a joint resolution of Congress. In addition, the foundation is creating a Center for Space Education on six acres of land adjacent to the memorial to further enhance NASA's education program. The center will also explore and develop new learning techniques and environments for the future. Plans for group and individual activities run the gamut, including: demonstrations, discussions, conferences, workshops, symposiums, and lectures. The center will also provide films, satellite transmissions, and

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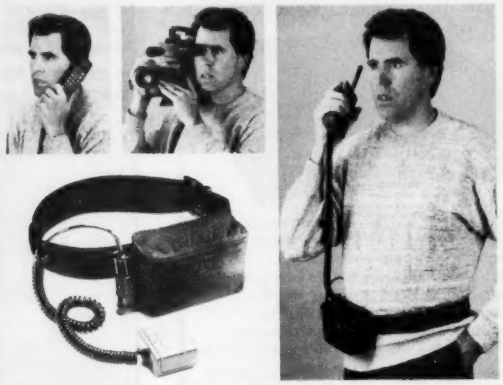

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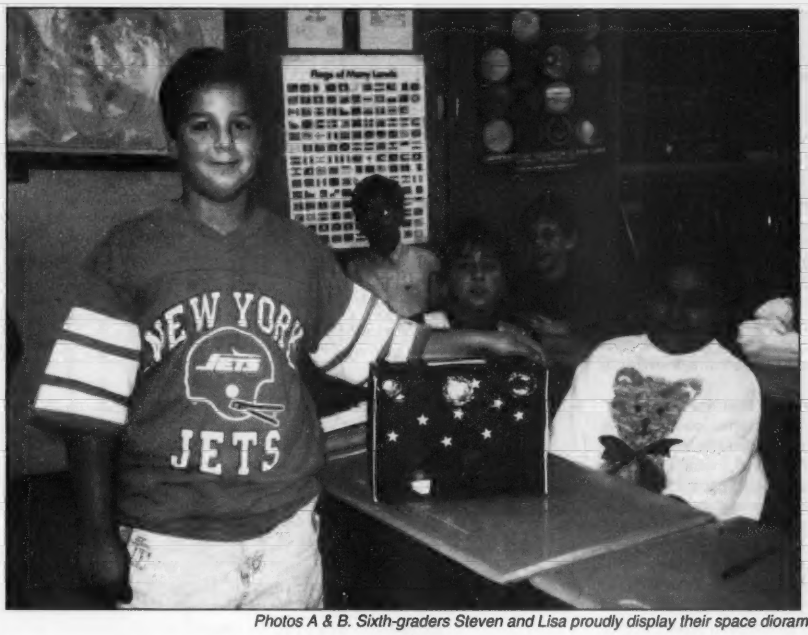

Photos A & B. Sixth-graders Steven and Lisa proudly display their space dioramas for the class.

curriculum materials to support the learning process. Funding for the center will come from the sale of Florida *Challenger* license plates, and from corporate, foundation, and individual contributors. For further information, contact the Astronaut Memorial Foundation, John F. Kennedy Space Center, Mail Code AMF, FL 32899 (407) 268-0272.

Be sure to let me know about any creative new innovations you come up with to help bring space science into the classroom. Sharing innovative lessons with other teachers and ham radio instructors remains the primary goal of this column. Please join us on The CQ All Schools net this fall when school begins. Listen for us on Tuesdays and Thursdays at 17:30 UTC on 28.303 MHz for 10 minutes. If you don't hear anything, after 10 minutes go to 21.325 MHz. After 10 minutes look for us on 14.325 MHz. 73

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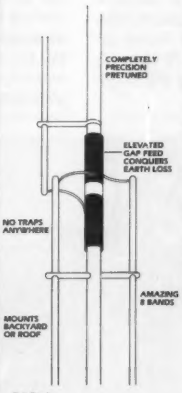

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A Low Cost, Low Power Pretzel Transmitter, Good Enough to Eat

This month's project started when I decided to clean up my workbench. Seemed I had all kinds of parts laying about on the bench to build a small transmitter (and a color TV, X-ray machine and so on.) So, with pencil in one hand and a broom in the other, I started working on a schematic while the soldering iron cooked on the workbench. This is a project that just begs to be changed and modified. In fact, I'd be upset if no one modified it for their own use. The schematic is shown in Figure 1.

The project began as a transmitter for 18 MHz but, lacking a proper crystal, the transmitter ended up on 10 MHz instead. Also, I built this project on a single piece of double-sided PC board using the *ugly* construction method. If you've never tried this method before, you're in for a surprise. Normally, you use high-value resistors (1 megohm or higher) as tie points for the various connections. I didn't take this route; I used *sky wiring* instead. In sky wiring, the connections between components just tangle in the air. This does make for a few problems, the biggest of which is having the different connections short out against one another. I fixed this problem by using small pieces of pretzel here and there. I always have a fresh supply of pretzel crumbs on my workbench. And no, I have no idea what the capacitance of a length of pretzel is.

You'll also need at least two sizes of soldering irons. A large, 35 watt iron is needed for soldering to the copper foil. The copper foil is a very good heat sink and a smaller iron (15 watts or less) does not have enough umph to make a good solder joint on the copper foil. You'll still need a smaller iron, though, to make connections between the individual parts.

To keep the cost down to almost nothing, the antenna connection is simply soldered directly to the output filter. Likewise, the crystal is soldered directly to the VXO capacitor, without a socket. Be careful when soldering to the crystal—too much heat and you'll end up destroying it.

The Circuit

A VXO is used for frequency control. They're simple to build and give you an ideal method of frequency control, without the drift of a VFO. The supply voltage to the oscillator is regulated in two different ways. First, a 78LO8 regulator provides a stable +8 volts to the collector of the oscillator's transistor. Second, a red LED is used to supply 1.5 volts of bias to the base of the transistor. A red LED makes a cheap and dirty regulator (and there were plenty laying around my bench).

By adding a small amount of inductance in series with the crystal, we can expand the range of the VXO. The value is not especially critical, so don't get overly concerned with the number of turns to use and on what core. Depending on the crystal, the amount of inductance may need to be changed to get proper VXO action.

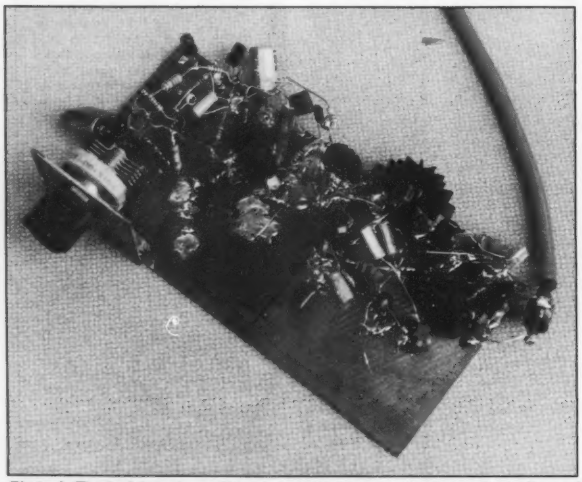

Photo A. The junk box rig on 30 meters. Note the pretzel between the buffer and the driver transistor.

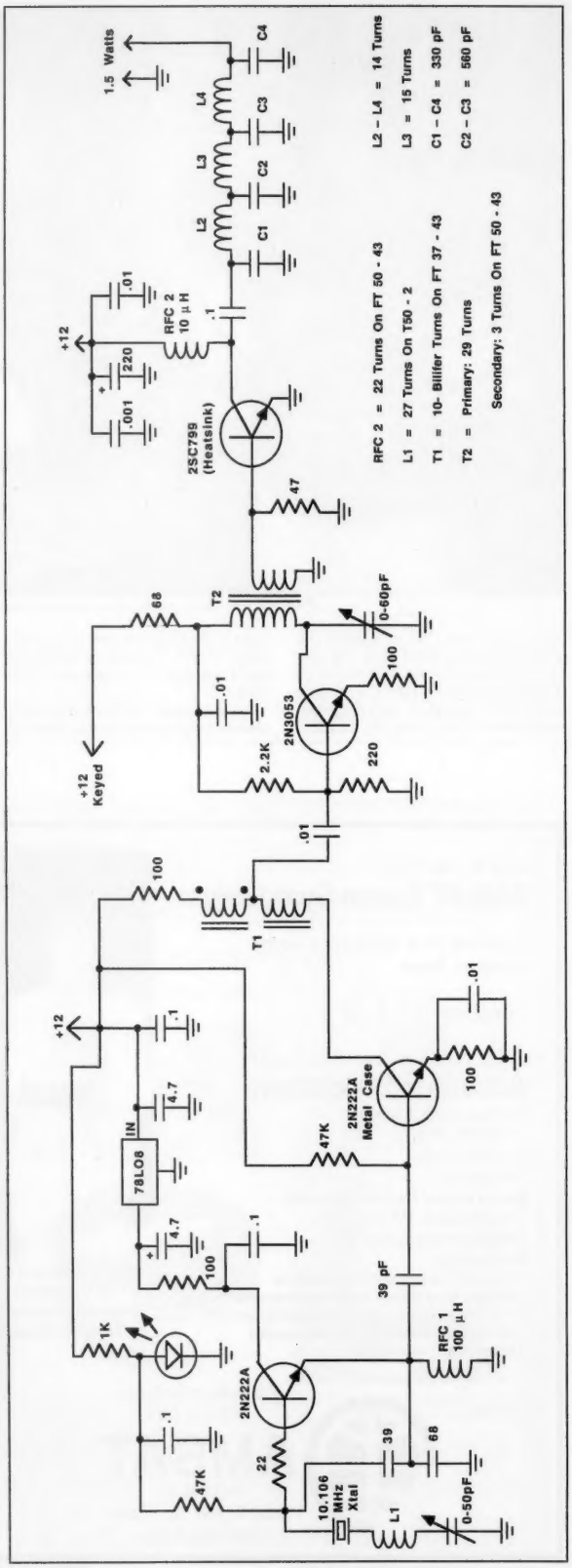

Figure 1. Schematic for the junk box 30 meter pretzel rig.

The main tuning capacitor I have listed as 50 pF on the schematic. In my version, the capacitor I used looks like it may be only 20 or 30 pF. Even with this small value, I'm able to go from 10.115 MHz to 10.122 MHz with a crystal marked 10.116 MHz. That's not too bad, as this range puts me right about in the middle of the action on the 30 meter band. Depending on the value used for your tuning capacitor, crystal and series inductors will determine the frequency swing. Some crystals will *bend* more than others, giving you greater VXO swings.

The oscillator runs all the time; it is not keyed. The supply voltage of the oscillator must be removed or you'll hear its signal in your receiver. If you plan on using this oscillator for a direct conversion receiver you'll need to keep it running. If you want, a second low-value capacitor may be used to couple some RF into a mixer for your receiver.

Energy from the oscillator is coupled to the buffer via a small capacitor. In my model, I found a 33 pF cap on the bench, so that is what I used. Reducing the value of this capacitor will reduce the amount of RF coupled into the buffer. The smaller the value, the less pulling of the oscillator during keying. To a lesser extent, this will affect the amount of output power, too. Don't go too low or you'll end up with a QRPp transmitter. On the other hand, don't use too much capacitance either. It will load down the oscillator and give you no more output at the antenna. Values between 20 and 100 pF should work just fine.

The buffer consists of another 2N2222 transistor. The 2N2222 I used is in the metal-case style. These seem to be a bit harder to kill and I've found you can get a bit more power out of these metal-cased units than the popular plastic jobs. A transformer decouples the RF from the collector of the buffer and a small amount is then placed at the base of the driver transistor.

The driver uses a 2N3053 transistor in the TO-5 case. This stage is tuned by the 2-40 pF trimmer on the collector of the driver. The trimmer I used seemed to be a bit too small, so another 37 pF capacitor was soldered in parallel with the trimmer. The driver is the only stage that is keyed. Keying is done by applying +12 volts to the driver. The transmitter keys very well. There are several bypass capacitors on the collector to keep RF out of the VCC line. In most cases a PNP keying transistor would be used here. I could not find one, so I keyed the rig by the "arm-strong" method—I used a clip lead! Figure 2 details a keying transistor and how you would interface it to the project. I did not use a heat sink on this driver transistor, but one wouldn't be a bad idea.

RF from the driver is coupled via the transformer's link turns to the PA transistor. A 47 ohm swamping resistor on the base of the PA transistor helps stabilize this stage. You'll need to use a heat sink on the PA transistor. The output filter is of a standard design using three toroids. Silver mica capacitors would be my capacitors of choice, but I used ceramic capacitors without any noticeable trouble.

By changing the input impedance of the filter we can get more RF out to the antenna. Normal input impedance is 50 ohms. This was exactly the case in my version. Instead of using the standard value capacitors in the first stage, I changed the input impedance of the filter. I started with 140 pF and, by adding small-value capacitors in parallel, I steadily increased output power. After I got done, I had over 3 watts of clean RF going to the antenna, and a real mess with all those capacitors soldered in parallel! Three watts is about one S-unit over the normal 1.5 watts you'll get. The values shown in the schematic will produce an output power of 1.5 watts. It's up to you to play with the output filter impedance and thus change the output power of the rig.

The transistor used in the PA is somewhat critical. Because the leads are rather long, it's best not to use a transistor with a lot of gain, especially in the UHF range. That means don't even think about using a 2N3866! I used a junk box version of a 2SC799. A transistor pulled from a junk CB would be a fine choice too.

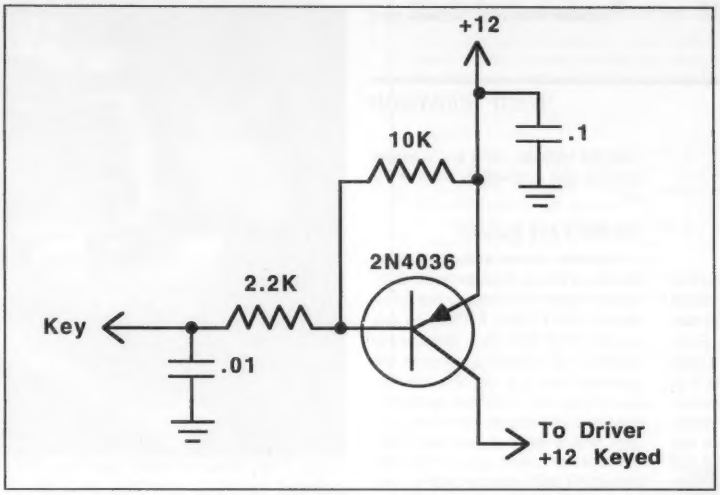

Figure 2. Schematic for an optional keying transistor and how you would interface it to the project.

As I mentioned earlier on, this is a project just begging to be changed and added to. The only points to worry about are the lead lengths on the PA transistor and the driver. Try to keep them as short as possible. This is especially true of the emitter lead of the PA transistor.

Remember, the case of the driver and the PA are connected internally to their collectors. Therefore, they are also connected to the VCC line. Don't allow them to contact the copper foil or you'll end up with fireworks and melted transistor leads.

Have a good time with this project. Even if you don't get it to work, it's great practice in radio theory. If nothing else, find out why something won't work. Learning is always a process of correcting mistakes.

Clear the Pretzels Off the Bench!

One of the reasons I had to clean up my workbench was to start construction of the ARK 40 transceiver. This is really a slick project, especially if you're tired of the usual VXO- or VFO-controlled NE602 transceiver. The ARK 40 will produce a hefty 5 watts output on the 40 meter band. Oh yes, the ARK 40 is a fully synthesized rig on the 40 meter band. It's simple to operate and a joy to use. You can find a complete review of the ARK 40 elsewhere in this issue of *73*.

Next month, I'll have some details about computing the values for the output filters. Until then, remember, use wits instead of watts. 73

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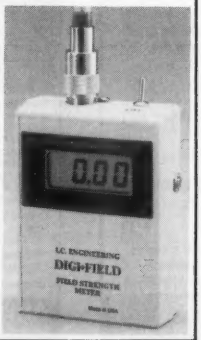

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ATV from Mt. Diablo

Just east of the San Francisco Bay Area lies a majestic mountain called Mt. Diablo that rises over 3,800 feet above the surrounding terrain. From the top of Mt. Diablo you can see most of the Bay Area (Berkeley and parts of the East Bay are shielded), as well as an unobstructed view of the Sacramento Valley. On a clear day you can see the snow-capped peaks of the Sierra Nevada range over 100 miles to the east stretching from north of Sacramento nearly down to Fresno. Mt. Diablo would seem to be the ideal site for an ATV repeater.

Don Smith W6NKF certainly thought so! In 1981 he installed his ATV repeater on a site near the top of the mountain. Don's system was a bit unusual since the Bay Area has a unique problem. It turns out that there is a military base near Sacramento that operates an over-the-horizon radar system called Pave Paws. This radar transmits megawatt pulses in the 420-450 MHz range that blanket the Bay Area, particularly the top of Mt. Diablo. Since any input in the 400 MHz band would be constantly wiped out by the radar, Don chose to put the input on the 1200 MHz band with the output on 427.25 MHz. He even worked out an agreement with the Pave Paws operators to keep the 427.25 MHz frequency clear from the radar signals. The repeater's output corresponds exactly with cable-ready channel 58 and allowed many folks to view the repeater using just a simple antenna and cable-ready VCR or TV set.

The W6CX ATV Repeater

Currently owned and operated by the Mount Diablo Amateur Radio Club, the Mt. Diablo ATV repeater has an input on 1253.25 MHz AM with an output on 427.25 MHz (both vertically polarized). The repeater's antennas are mounted near the top of a 190-foot tower near the mountain peak and provide a 360-degree view of the region. With a range of over 100 miles, the repeater covers most of the San Francisco Bay Area, as well as the Sacramento Valley from north of Sacramento to south of Stockton and into the foothills of the Sierras. There are around 40 active members on the air (and many more who monitor the repeater via cable-ready VCRs). Two of the members reliably access the repeater from over 90 miles away. Occasionally the Black Mountain group will retransmit the Mt. Diablo output through their repeater in the San Jose area so that those in the East Bay can view the activities.

Every Thursday evening at 8 p.m Pacific time, an ATV net is held on the 147.06 repeater and usually generates a lot of activity. This repeater and the 224.78 repeater are generally used for the ATV talk frequency in the region.

PACIFICON'93

Sponsored by the Mt. Diablo ARC, this year's PACIFICON convention (held October 22-24 at the Concord Hilton hotel) will again feature a live ATV demonstration console (see the photo). The ATV group plans to cover featured speakers, special events and highlights of the convention through the use of multiple cameras, videotape and remote feeds. This footage can be seen on the hotel's in-house cable system and will be transmitted through the ATV repeater as well.

Photo A. Jim Tittle KC6SOE mans the ATV control console during PACIFICON'92.

One highlight this year will be an ATV balloon launch. Bill Brown WB8ELK and Don Smith W6NKF will be sending up the balloon between 10 a.m. and 11 a.m. on Saturday from the Concord Airport (Buchannan Field), just one mile from the convention. The balloon will feature a live TV camera transmission on 434 MHz, with on-screen telemetry overlay. An on-board GPS receiver will relay the balloon's position to aid in tracking and recovery. In addition, a simplex repeater will operate on 2m (144.34 MHz) and a beacon can be heard on 28.322 MHz. At the peak altitude of 110,000 feet, anyone within 400 miles of the Bay Area should be able to see the balloon's video and work through the repeater.

The chase team T-hunt group will be led by Syd Furman W6QWK and anyone with DF gear is invited to join in the chase effort. If all goes well with the Saturday launch, a second flight is tentatively planned for Sunday morning as well.

The Future

A 1200 MHz output for the Mt. Diablo ATV repeater is in the works (in addition to the 427.25 MHz output). Also, plans are being made to eventually establish a microwave linkup with Southern California.

If you'd like to see what's going on in the North Bay area, just drop on by for the Thursday night net and watch the action. With over 50 watts output power (soon to be 100 watts), you should be able to see the repeater with modest equipment (cable-ready VCR/TV and just about any outside antenna) as long as you're line-of-sight to the mountain. 73

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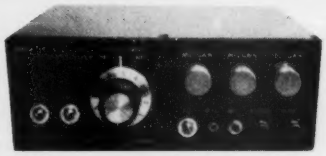

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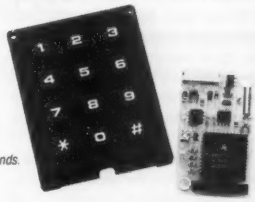

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10 GHz SSB QRP Transceiver

This month I thought I would describe a 10 GHz SSB QRP rig in its simplest form, then later show you how to modify it into a very formidable station. The improvements to the basic SSB converter can be added easily to make it buildable from the components you have. By following the basic layout you should be able to duplicate this rig at various stages of evolution—from the very basic to the more complex 10 GHz SSB station. The IF frequency used in each case is 2 meters.

This design process might look a little awkward but be assured, this rig is quite formidable in operation. Last month we discussed some of the reasons why reduced bandwidth systems are high performers. This month we will discuss this basic 10 GHz SSB system, which delivers high performance yet is constructed from minimum components. Then with this same basic circuit you can add components as you find them. I will attempt to describe several modifications or steps that will guide you in modifying the original unit shown in Photo A. Don't be afraid to make changes—what you build really depends on what you want to spend. The different levels of complexity are offered in an attempt to vary the design to suit your needs.

The main ingredients needed to construct a 10 GHz system include a local oscillator, a Frequency West brick-type amplifier, and the mixer (an orthagonal waveguide-type unit). The RF port of the mixer is connected to a 10 GHz antenna and, with a 2 meter transceiver set to low power, is connected to the IF port. This simple setup will be capable of making narrowband contacts on 10 GHz. See Figure 1 and Photo A, both showing an operating simple system for 10 GHz. This setup will work quite well and is capable of making either narrowband FM or SSB contacts. This, of course, is dependent on the type of 2 meter rig you use for the IF transceiver. My rigs are an ICOM 202, and a Santec LS-202A multimode HT. Both rigs were used. They're both older radios but, they perform quite well. The Santec has been my main radio for SSB operation.

The design of this system is what I prefer to call a "COAXIAL" based system, differing from a "WAVEGUIDE" based system, such as in wideband FM. Components can be added to this system as desired to improve its capabilities. Each component added to the system can increase its complexity and cost. However, each has specific attributes giving system performance improvements that far offset the costs involved. The first improvement to be considered is the RF preamplifier and associated coaxial switch that is needed for a dual role for the amplifier. More on that later.

The preamplifier that we use is a dual-stage amplifier using two MGF-1402 FETs. The amplifier PC board for this amplifier is 3/4" by 1" and constructed on 0.031 Teflon PC board. Figure 2 shows the schematic for this preamp. The source leads are connected to ground on the board with a very short lead length (actually no lead) and upside down. With the case inserted in the hole cut in the PC board (with the FET upside down), the ground foil is soldered directly to this gold metalization of the case, making for almost zero lead length. This is the biggest secret in construction of this PC board amplifier: zero lead length of the source lead, making for minimum inductance in the source path to ground. Please note that some designs require some inductance in the source leads; however, this design does not.

At lower frequencies, FETs give increased gain, and this further increases as frequency is reduced. FETs that have an Ft (frequency total) of 80 GHz or so become unstable at very low frequencies. That's why some source inductance is necessary at low frequencies to help make the design stable. At high microwave frequencies this is undesirable and will make a design function better as an attenuator than as an amplifier. The thing to remember is that the extreme towards minimum is necessary at upper microwave frequencies.

The rest of the construction is basic in that good microwave components

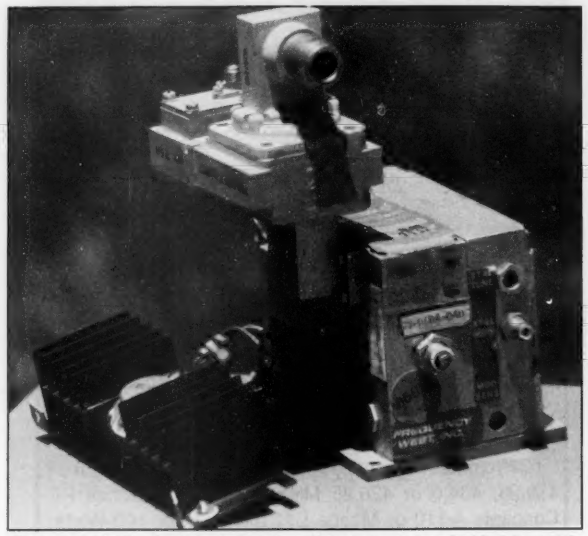

Photo A. A 10 GHz QRP rig. A 20 volt regulator is located on the black heat sink.

are necessary for low loss. That mandates that chip resistors and chip ceramic capacitors be used in the preamplifier. If you wish to design your own amplifier, a program called PUFF is available from CALTECH that will allow you to design your own custom PC board with the FET of your choice.

"Above and Beyond" for May and June 1992 covered PUFF and its applications.

Take, for example, an amplifier which was designed using PUFF with an NEC-04583 FET. This circuit or others could be used in place of the dual-stage amplifier described earlier. Both

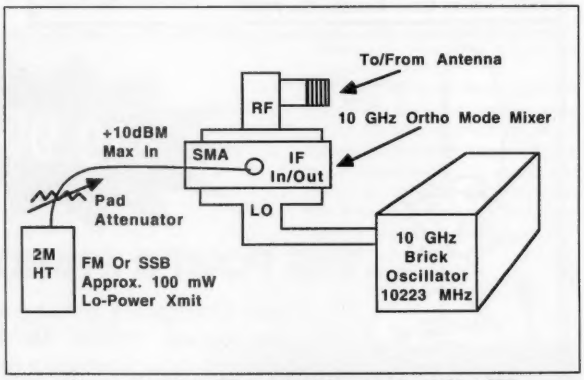

Figure 1. A 10 GHz QRP rig suitable for narrowband FM or SSB.

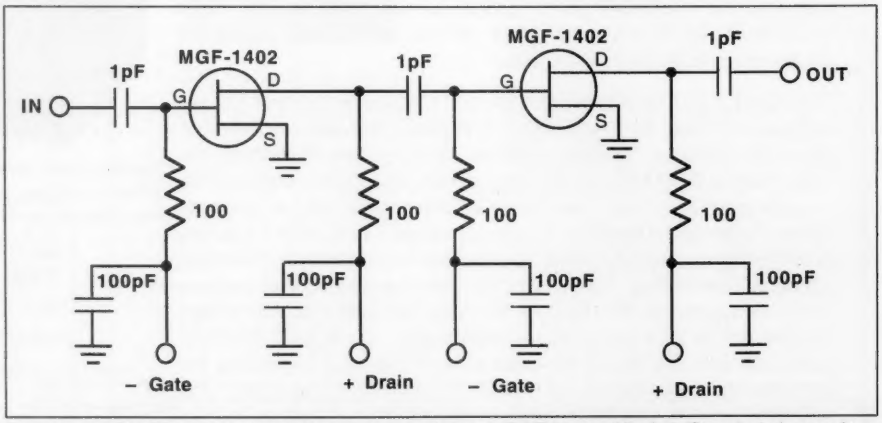

Figure 2. A 10 GHz RF amplifier with 18 dB gain and approximately 2 dB NF. It is capable of +5 dBm output when used as a transmit amplifier.

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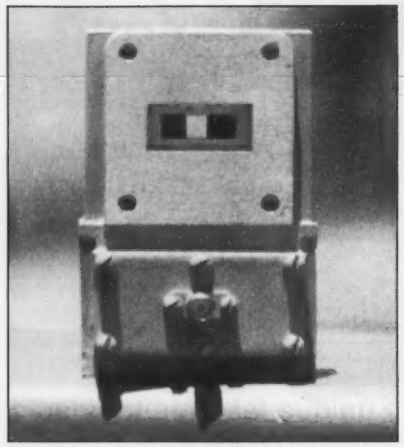

Photo B. A 10 GHz ortho mode mixer. Looking through the mixer waveguide port you can see rear port 90 degrees offset. The SMA connector is the IF port.

Photo D. My trusty Santec LS-202A 2 meter FM/SSB HT.

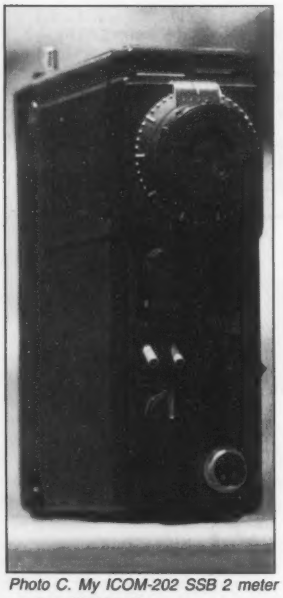

Photo C. My ICOM-202 SSB 2 meter pre-hand-held radio.

designs require a simple bias supply to function. It can be as simple as a "double A" (AA) flashlight cell connected up to supply negative gate bias current. An additional positive regulator is required as well, for the drain supply. Normally this voltage is near +4 volts. We have built both simple supplies and ones that use ICs to generate the negative voltage. Either will work well.

The bias (negative) is adjusted to give the required drain current for your FET. This can be adjusted for a minimum noise figure or increased for higher current for slightly more power output. Check your FET's specification sheet for exact current requirements. For the MGF 1402 FETs we adjust the first low-noise stage (between 10 and 15 mA) for minimum noise. The second stage is set (to 20 mA) for best gain. Next comes the relay switching. We could live without them and dedicate the amplifier for either receive or transmit. But, in this case I decided to use the same amp for receive and transmit and switch it with relays.

The relay used at 10 GHz must be rated for 10 GHz operation. As such, the circuitry internal to the coaxial switch resembles a transmission line, providing for low losses at microwave frequencies. Two types of relays can be used: the SPDT (single-pole double-throw) type, or the transfer type. Several SPDT relays would have to be used but only one transfer relay is needed to work in the simplest configuration. I have used each method and they both work well.

For simplicity, the transfer relay is the easiest to use, that is if you can locate one. It is most suitable as only one relay is required, allowing the preamplifier to be used for both receive and transmit amplification. You can usually tell a transfer relay from its standard counterpart by the *four* coaxial connectors on the transfer relay, versus three for a standard SPDT type coaxial relay.

Let's look into the construction of each and see what is going on. In the SPDT type (miniature SMA type relay) there are two sets of contacts, as shown in Figure 4. This relay can best be described as having balanced pole operation, like a teeter-totter. One section makes contact with half of the common center pin and the other contact (let's call it normally closed). The other section is off balance or down to ground making no contact to any coaxial connector, maximum isolation. When the relay is energized, the normally closed contact toggles and becomes the one that is now grounded or off-balanced and the other section (the normally open contact) is now making connection between the other half of the center contact and the normally open contact. SPDT operation.

The operation in a transfer relay is quite different in some respects in that it has four (coaxial connector) contacts. It has a modification of the teeter-totter operation in that there are four contact bars while the SPDT type has two. The toggle operation occurs between two of these bars diagonally positioned inside the relay. What happens is that the relay makes contact along the top and bottom of the relay, leaving the side bars in the open position. When the relay is activated the top and bottom release their connections and the left and right side bars make connection. See Figure 5 for details on the transfer relay and its schematic switching application.

With either relay system in place, switching an amplifier from receive and transmit is quite easy. It can become complex if and when we add additional components into this switching loop. For a basic SSB unit with switching, this is all you need for an operational SSB 10 GHz narrowband system using 2 meters as an IF. Drive

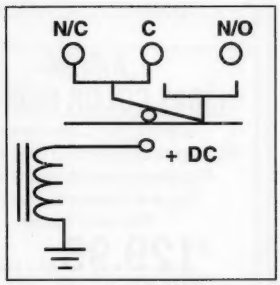

Figure 4. A SPDT relay.

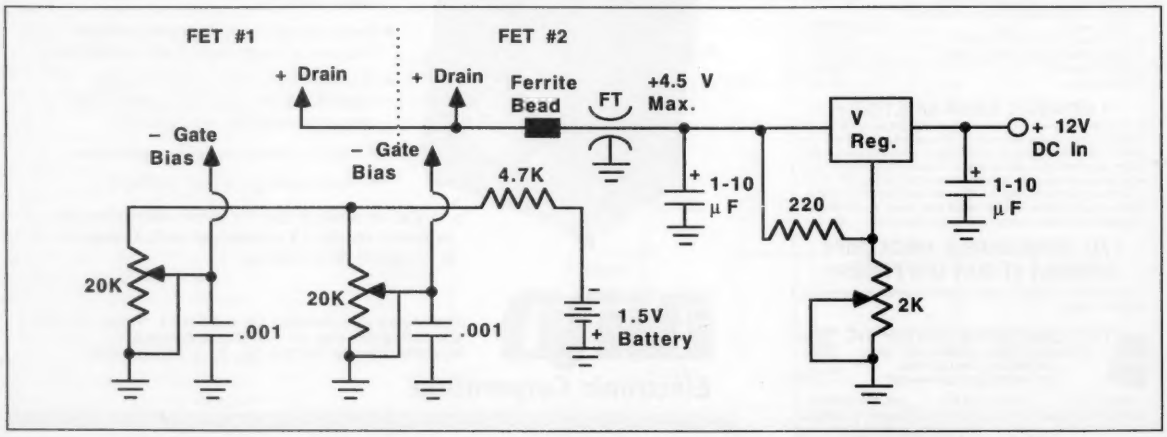

Figure 3. A DC bias supply for the 10 GHz amplifier. The battery should last for a couple of months.

power should be held to +10 dBm maximum to the mixer.

This system, with a 10 GHz FET amplifier (home-brew), can boost output power on transmit to somewhere near the +5 to +8 dBm power level. That's a power output of 4 mW to 7 mW (0.007W). Don't scoff at that power as it is quite capable of driving other higher-power amplifiers, such as traveling wave tubes, to full power of 10 watts or more. These do not need to be added now but can be as time and money allow. The simpler low power rig will work quite well with the lower power level. Additional gain can be quickly realized through passive antenna gains.

Realize that 0.007 watts is real QRP power and can give exceptional operation using SSB. Comparing operation on 10 GHz QRP levels and system gains in respect to lower frequencies such as 2 meters, you can draw comparisons by noting that with lower frequencies antenna gain is markedly reduced. A 30" dish antenna on 10 GHz can exhibit 35 dB gain, making for quite a punch, even when using a QRP rig. That's a lot of gain advantage even when compared to a good 2 meter antenna which can run in the 10 to 15 dB range. You would have quite an antenna farm at 2 meters for similar gain as this small dish at 10 GHz.

That's one factor which makes QRP levels workable with reduced bandwidth SSB microwave operation: very high antenna gain and very low power systems. Comparing even further: At 24 GHz the same approach is used, making more power gain in the antenna than is usually in the amplifier at this level. Most rigs today for 24 GHz are limited to very low QRP levels; that is, before antenna gains. This passive antenna gain is what gives microwave low power level rigs quite a boost in radiated power. This gain in power is the most inexpensive to accomplish in short order. The bad news, at least on 24 GHz, is that the equipment is difficult to obtain even in the land of plenty here in California. If there is inexpensive equipment for 24 GHz then it should be advertised because it would sell.

So much for QRP antennas. The main point is that at a very low QRP level, stations at microwave frequencies are still very effective. The 10 GHz QRP station described above, with or without the preamplifier, is an effective system. Don't let yourself be locked into the design that I presented in the example given. The local oscillator does not have to be a waveguide type of system to mate with an orthagonal type of waveguide mixer. In this case use a waveguide to coaxial transition to accomplish the connection in and out of the mixer. There are many different methods that you can use to make adjustments in system construction and still have a great rig.

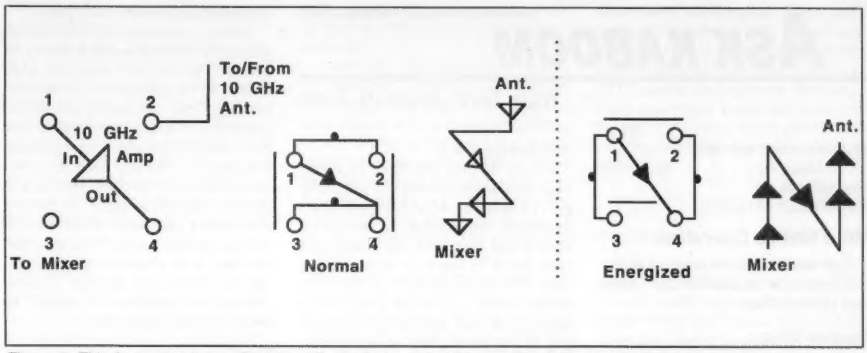

Figure 5. This four-contact transfer relay effectively reverses the amplifier. It is wired with the amplifier in to terminal 1; amplifier out to terminal 4; antenna to terminal 2; mixer out to terminal 3. Normal (not energized) state: contacts 1—2 & 3—4 closed. When energized, the relay opens 1—2 & 3—4 and 1—3 & 2-4 connect.

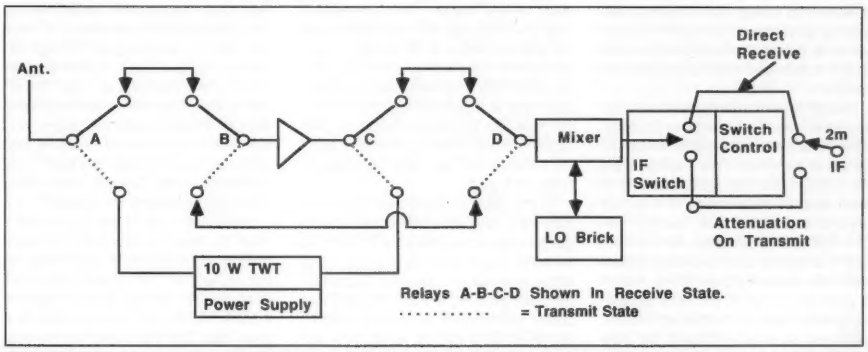

Figure 6. Full implementation of switching with 4 SPDT coax relays, switchable preamp, and 10 watt high power TWT amplifier.

Mailbox

Steve Roberts N8VKD of Suffield, Ohio, is looking for others in the Ohio area who are interested in 1.2 GHz and above. He remarked that "if you asked for a Gunn you might get a response like 0.22 or 0.45 caliber." Well, the same mystique abounds here in California. I have difficulty with the knowledge gap, so when you get on to discussing the electron effect in Gunn devices being negative resistance . . . well, you can just imagine the eyes glassing over. It's a hard hill to hoe without some moral support, especially when you know that you are well-founded in scientific fact. Trying to convince someone that negative resistance is a true phenomenon is about as easy as teaching a pig to sing. What we did here was to set up a sign and an operating 10 GHz simple wideband two-way system at our local ham swap meets and we were able to get quite a response to our pleadings. Later we formed the San Diego Microwave Group.

I think all that is needed is a little prodding and a lot of advertising, similar to the methods we used. Club meetings and such are a good example and I am sure most are looking for a good program to provide for their members. Sure, you won't interest all the members attending, but a good well-rounded information session on your part of the frequency spectrum as it applies to amateur radio in general can come off well.

Raymond N6RE writes that ever since I published the material on converting the 3.7 GHz LNA amplifiers he has been looking for some to modify. Could we steer him in the right direction? Well, I can only offer some likely sources for you to try. The first is the newspaper—look in the classified ads for satellite antenna installers and also in the Yellow Pages under satellite and TV shops. I made several calls to local shops and most wanted to sell me brand-new units. In bigger shops try to get by the salesman and talk to the repair technician. When I was able to do that I was able to line up some prospects that might prove interesting. One call to a local high profile installer was met with the initial "sell, sell," but when he found out that I wanted older units for amateur applications and not satellite use, he stated that he was licensed also.

I have yet to visit him, and don't expect to be given a box full of units. But, rather, I have found out that for a reasonable (small) dollar amount he would be willing to part with some used units. The price discussed was less then $15 each, but somewhat higher than the $5 or so I was accustomed to paying at swap meets. However, his units seemed to be a better bet, as the swap meet prices do not include a guarantee of any kind. It just goes to show that you have to go beyond the normal scrounging attempts and get behind the screens of most bigger companies and talk to the people doing the work to locate parts. Give it a try.

Richard KBØMR of Aberdeen, South Dakota, writes: "Where can I buy a TWT amplifier similar to the ones you described in the July 1993 issue of *73 Amateur Radio Today*?" Well, Richard, they're not the easiest to locate and when amateurs have found them they were not always careful to get matching power supplies and tubes with them. That's the main reason I wrote the article—to inform our readers about what is available in surplus. From time to time I have a spare unit and they have sold for less than $200 for a working unit. I feel that the price in some surplus outlets is far too high and they don't even guarantee that they will function. I guess they're looking for a customer who is willing to pay the high price for exactly what he wants.

At this moment, I don't have a source for these materials. Components used to come out of Surplus Sales for Collins Electronics in Richardson, Texas. If I locate a source I'll print it; if anyone knows of one please drop me a line.

Well, that's it for this month. As always, I will be glad to answer questions concerning microwave and other amateur related topics. Please send an S.A.S.E. for a quick response. 73

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More Mobile Operation

Last time, we were discussing mobile ham radio installation and operation. Let's continue.

The Real Thing

OK, you got a few bucks together or you got lucky at a hamfest, and you bought yourself a real mobile rig. What can you expect? Well, it sure will work a whole lot better than an HT! Now you've got anywhere from 10 to 50 watts of power, tremendously greater audio output and, hopefully, a tougher receiver.

Installing a mobile rig is pretty easy, but there are a few things to consider. First of all, you need good, clean DC power at anywhere from 5 to 15 amps. As I mentioned last time, there is no such thing as clean power in a car; it's always loaded with junk. Luckily, mobile rigs, being designed for car use, take that into account and usually have their own internal power filters. Here's a good way to tell: If you have alternator whine, either in transmit or receive, you need an external filter. If not, then don't worry about it.

If your rig puts out 10 or 15 watts, your power requirements probably aren't that heavy. Most likely, you don't need more than 5 amps. You should be able to get that from the fusebox. A good place to tap in is on the fused side of the line powering your car stereo. Heck, you're not going to be blasting it at high volume and transmitting at the same time, so you're not likely to blow the fuse. And even if you do, there's no big harm done. Just be sure to connect up to the correct side. *Never* run any radio gear (or anything else, for that matter) from an unfused line. The damage you can do to your car just isn't worth it. Of course, if your rig's power cord has its own fuse, then you can hook it up wherever you want. Just keep in mind that any short before the fuse can still cause trouble. In particular, run the wires so that they won't be crimped by the car's brackets or other body parts.

If you have a high-power rig which puts out, say, 40 or 50 watts, you're gonna need some real juice to run it. At 50 watts output, you may need up to 15 amps, and that ain't peanuts, especially because your rig is FM and runs that power *continuously* while you transmit, unlike an SSB HF rig, which only demands high current on voice peaks.

Getting that much current through your car's electrical wiring is asking for trouble. The preferred method is to go directly to the car battery, but that can be tricky. Your car battery can deliver hundreds of amps on demand, and that kind of current is dangerous. Shorting a car battery even for a moment will cause serious sparks and possibly melt the wiring or the battery. The battery may even explode as its internal gasses quickly build up under the heat of its chemical reaction. You can be disfigured, blinded or even killed by an exploding car battery, so please, please play it safe.

How?

First of all, get approved high-current wiring from an autosound or auto parts dealer. Whatever you do, *don't* use coax cable as DC power wiring. Yes, it's shielded and seems to work well, but it is not designed for high DC current, nor is it meant for the temperatures under the hood of a car. The result is that, over time, the inner conductor's plastic jacket will deform and eventually melt through, causing precisely the kind of disastrous short I just discussed above. The risk of an underhood, car-destroying fire is large.

Whatever kind of wire you use, it must be rated to carry the intended current. Also, you must fuse it right at the battery so that shorts anywhere down the line will not cause a disaster. Another fuse right at the radio is a good idea, but that alone will not protect you if, say, the wire shorts at the firewall or comes in contact with the engine or radiator and melts.

When connecting things to the car battery, be sure to disconnect the battery's negative terminal first so that there can be no return circuit through the car body. That simple precaution can prevent serious injury. Remember, there's enough current there to take your finger off, should it inadvertently connect through a ring you're wearing. It has happened.

Ground?

Obviously, there's no real "ground" on a moving car. But to the circuit, ground is the car body and chassis. Where do you hook the negative lead up? Well, for low-current radios, just about any metal screw in the passenger compartment will do. To check for suitability, use an ohmmeter to be sure the screw is, indeed, connected to the chassis. Especially on late-model cars, many screws are set in plastic, which, obviously, won't do.

In high-current applications, it is best to ground the negative lead to a large screw in the engine compartment, somewhere fairly near the battery. Check the spot where the battery itself connects to ground; what could be better?

Where Does It Go?

In today's small cars, it can be hard to find a good place for your rig. Look for a spot where you can easily operate the controls without interference to your driving. Also, the mike cord has to

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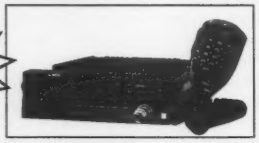

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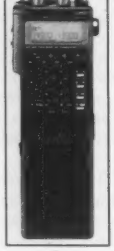

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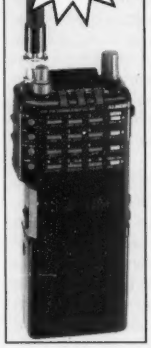

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reach your mouth without getting tangled in the steering wheel or gearshift lever. And you have to have unobstructed access to the foot pedals. Finally, make sure you don't mount the rig where you will smash into it with a knee or other body part in the event of an accident. If you just can't find such a location, consider buying one of the new rigs which lets you separate the control head from the rest of the radio. The small heads fit just about anywhere.

The Skyhook

Many hams use magnetic-mount antennas because they're easy to remove and hide, and they don't require any installation. They work well, but they do have a tendency to scratch the car's paint. When you put the antenna on, be sure to wipe the mount's bottom off first, because the powerful magnet often picks up little metallic bits and those can really eat your paint away. When the antenna is in the car, be sure to put it somewhere where it can't be seen, and also consider how close you are putting that giant magnet to your stereo, recorded tapes, the rig and other equipment. I keep mine in the back, away from everything.

The coax cable usually exits through the door seal, a window or perhaps the trunk or hatch. The main considerations are that the cable doesn't get crimped (which could result in a transmitter-damaging short) and that rain doesn't get into the car at the entry point. Luckily, most cars have big enough rubber seals that these problems don't occur.

For permanently mounted antennas, just follow the manufacturer's directions. If you're going with a permanent roof mount, it may be best to let a professional shop do the drilling and mounting. I tried it myself once, and it was *very* difficult to drill through the roof. Mine eventually worked out fine, but it is possible to have serious leakage problems which result in rust damage.

The Ultimate

Mobile VHF/UHF is plenty of fun, but nothing compares with talking around the world on HF while tooling down the highway. Installing a mobile HF setup is much like installing a high-power VHF/UHF rig, but there are a few extra considerations.

You will need lots of current. Assuming the standard 100 watt rig, figure on 20 amps. Some HF rigs are very tolerant of varying voltage, while others tend to "FM" and pull off frequency or experience other problems if the voltage swings as you talk. So, be sure to use extra-heavy DC wiring and go directly to the battery; forget connecting to the fusebox. All the same guidelines for high-power installation I discussed above apply. With SSB, AM or CW, though, your receiver is amplitude-sensitive, and engine and alternator noise problems will be much worse. You can buy shielded high-current power wiring, and it's probably a good idea. But again, *don't* use coax, no matter how tempting it may seem. Your rig won't be much use to you if the car burns up.

There are various kinds of mobile HF antennas, but most are designed for bumper mounting. I have had the best results with a standard bumper mount, a whip spring and a guy string. I keep the string tied to the back of my seat and run it out the hatch window to hold the antenna in place. If you have a trunk, you can run it out the top of the trunk after tying it to an internal support.

Running the antenna coax can be a problem. Look at the bottom of your trunk or under your hatch area and you probably will find a few rubber plugs. You should be able to remove one and run the cable through the hole. Be absolutely sure to use some silicone sealer to plug the hole back up, though, or you will have leakage problems. When routing the cable underneath the car, keep it away from the muffler, exhaust pipes and gas tank. Finally, be sure to ground the antenna mount to the car and use some coax sealer to weatherproof the connection. Don't expect to do an HF installation in an hour or two. Usually it takes an entire afternoon.

Well, there's a little more to cover, but I'm running out of room. Before we go, let's look at a letter:

Dear Kaboom,

I'm a 22-year-old sailor in the U.S. Navy. I've enjoyed listening to HF DX since I was 12 years old and hope to soon have my General Class ham license. I've never really known any ham operators and have lots of questions regarding operating practices, RTTY, packet and such. Is there anybody you could steer me to to get my feet wet? Also, could you tell me which products I should buy to set up a station?

Signed,
Ready To Go

Dear Ready,

I see that you are stationed in Japan. You are lucky to be in the highest per capita ham population in the world. There are over a million hams there and plenty of clubs. Also, they have some serious ham magazines. Unfortunately, you will need to speak Japanese! Lots of U.S. ships have ham facilities because many of the radio operators are hams. Have you checked this out? Perhaps the help you need is right there on the ship! If not, consider getting an English-speaking Japanese friend to show you around or take you to a club meeting. Finally, keep reading *73!* As for product recommendations, I'm not in a position to do that. Most of the companies make good gear and the choice is really up to you. The best thing you can do is get your license and get on the air. Once you do, you'll find more opinions and advice than you ever wanted. I hope to hear you on the HF bands!

Until next time, safe and happy mobiling from KB1UM.

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Notes from FN42

More good stuff for this month including, the FAIRS trip to Bangladesh (S21-land) to train more amateurs there, and a report from Mike Shakirov UA9MI on the DXpedition to Bering Island in 1992.

I am also very happy to report that Lorenzo Gaston DU1CHD/6 has volunteered to become the Hambassador to the Philippines. He enclosed several great articles, but there was not enough room in this issue to print any of them, so look forward to one of them next month.

Since space was a bit short last month, let me be brief so more info can make it across the press. 73, Arnie N1BAC.

Roundup

Bangladesh FAIRS Bangladesh Trip Report: An international group of FAIRS (Foundation for Amateur International Radio Service, Inc.) members planned an amateur radio training program in Dhaka, Bangladesh, during early 1993. The training was to help develop a group of amateur radio operators that could lead to the development of a disaster preparedness amateur radio network in Bangladesh. A DXpedition to help provide training by actual amateur operation was planned. The DXpedition operators hoped to make thousands of radio contacts worldwide. These contacts would give great visibility and support for amateur radio and FAIRS in Bangladesh.

The results of two years of planning and almost three weeks on location in Bangladesh exceeded our most optimistic goals. The international team of three Americans (one American traveled from Taiwan), two Ukrainians, and three Russians arrived on schedule with over half a ton of training and radio equipment. A five-day training program in amateur radio for 30 Bangladeshies was

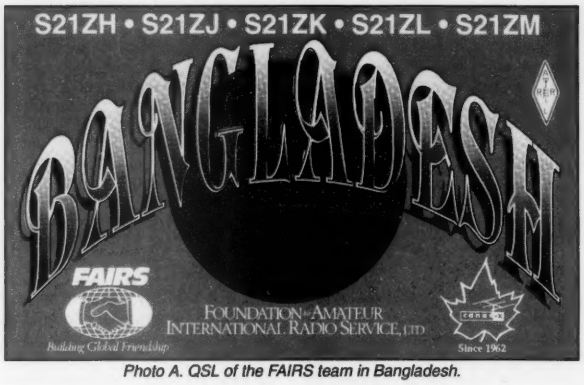

Photo A. QSL of the FAIRS team in Bangladesh.

well-attended. A total of 17 of the 30 participants passed the USA amateur license examinations, which showed there were some highly motivated individuals interested in becoming radio amateur operators. Training for government personnel was provided by Mr. Richard Baldwin, the president of the International Amateur Radio Union (IARU). Mr. Baldwin presented a five-day workshop to about 12 staff members of the Bangladesh Telephone and Telegraph Board (BTTB). His workshop included: the history of amateur and commercial radio, development of international regulations, why amateur radio is good for a country and its citizens, how to develop regulations for governing the use of amateur radio and how to develop amateur radio license procedures. Mr. Baldwin's workshop was independent from FAIRS; however, it was coordinated by FAIRS, the ARRL, and the IARU.

These two training programs made a very significant and positive effect on the interest and awareness of amateur radio in the government,

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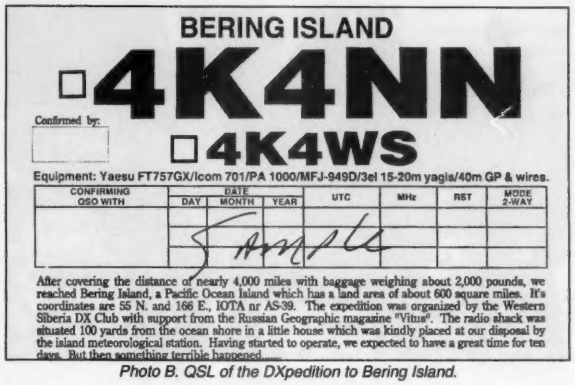
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Sample
After covering the distance of nearly 4,000 miles with baggage weighing about 2,000 pounds, we reached Bering Island, a Pacific Ocean Island which has a land area of about 600 square miles. It's coordinates are 55 N. and 166 E., IOTA nr AS-39. The expedition was organized by the Western Siberia DX Club with support from the Russian Geographic magazine "Vitus". The radio shack was situated 100 yards from the ocean shore in a little house which was kindly placed at our disposal by the island meteorological station. Having started to operate, we expected to have a great time for ten days. But then something terrible happened.....

Photo B. QSL of the DXpedition to Bering Island.

N.G.O., and private sector.

The FAIRS team was fortunate to meet with many officials of the government ministry for telephone and telecommunications in favorable discussions supporting amateur radio. Five Bangladesh amateur radio licenses were issued to our team by BTTB. More than 25,000 radio contacts with amateurs worldwide were made with the three radio stations brought from the USA, Ukraine, and Russia. The FAIRS radio DXpedition was a tremendous success and as a result thousands of radio amateurs and others around the world will be aware of the new interest in amateur radio in Bangladesh.

The international FAIRS team included: David Larsen KK4WW/UB5WUS/S21ZJ, Executive Director, FAIRS; Gaynell Larsen KD4GMV/UB5WMV/S21ZH, Vice Director, FAIRS; Victor Goncharsky UB5WE/KC1VF/S21ZM, FAIRS European Operations Director; Helen Goncharsky RB5WA/KB0KNC/S21ZM (2nd op), FAIRS Europe Secretary; Yuri Katyutin UA4LCQ/KD4STR/S21ZL, Director of Operations, FAIRS Russia; Larry Vogt BV/N4VA/S21ZK, FAIRS Training Director, ITU Region 3; Serge Tarasov UA4LLQ/KD4QAU/S21ZL (2nd op), FAIRS member Russia; and Vyacheslav Sergeev, CIS Team Sponsor.

For further information about this trip, future trips, or about FAIRS, contact David Larsen, Executive Director, FAIRS, PO Box 341, Floyd VA 24091, USA; (703) 231-6478; (703) 382-9099; Fax: (703) 382-2935; Internet: david.larsen@fairs.org.

[There was much more of their report, but space was not available to print it all.—Arnie]

Russia HELLO FROM BERING ISLAND! From August 25 to September 7, 1992, four members of the West Siberian DX Club operated a station located on Bering Island, coordinates 55 North and 166 East, IOTA AS-39. The expedition was organized with some support and direct participation of the Russian geographic magazine *Vitus*.

The expedition was devoted to the 250th anniversary of the discovery of the Commodore Islands by Russian explorers under the leadership of Captain Vitus Bering. The radio DXpedition was comprised of four radio amateurs from the city of Omsk, oblast 146: Valery Matushin UA9NN, chief of the WSDXC; Alexander Ernst UA9MR; Igor Suprunov UA9MFW; and Mike Shakirov UA9MI.

After traveling a distance of 4,000 miles with about 500 kg. of baggage, we reached the Pacific Ocean island of Bering. The island is about 600 square miles of land area and has a population of 1,500 people. Our license gave us permission to operate as 4K4NN and 4K4West Siberia. We were going to operate with the latter call in the All Asian Contest.

The radio shack was situated 100 yards from the shoreline on the first floor of a small house which was kindly placed at our disposal by the island meteorological station. Our equipment included Yaesu FT757GX and ICOM 701 transceivers, a 1 kW amplifier, and an MFJ-949D tuner. Due to a good choice of a clearing with green grass, and the sunny weather, we quickly put up the antennas, a three-element yagi on the 15 and 20 meter bands, a full-size ground plane on 40 meters, and a longwire for the other bands.

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and Japan and some good openings to the South Pacific. The propagation to Europe was fair in the morning and evening. Most signals to all locations were only about S3 to S5! The best propagation was at the end of August, but beginning in September the propagation abruptly deteriorated. Unfortunately, we failed to operate on the 10 and 12 meter bands while propagation was good in August. During that time, we worked on the 30, 40, and 80 meter bands.

On the 5th of September, hurricane force winds hit the island! The winds gusted up to 80 miles per hour, and the temperature dropped to 0 degrees C, or about 30 degrees F. The wind raged for two days and destroyed all of our antennas and our plans for future operations! Luckily, the building where our shack was located did not suffer any damage.

It must be said that the author of these lines, as well as the other members of the DXpedition, were shocked with the rage of the hurricane. It was the first time that we had witnessed this natural phenomenon. Because of the hurricane, we were not able to carry out our plans to take part in the All Asian Contest or launch a balloon with a longwire for the 160 meter band. We had also planned to operate from Medny Island (Cooper), a smaller island in this group.

On Tuesday, the 8th of September, we left our troubles and the debris of our antennas on the island and flew in a small airplane back to the continent. It took us 48 hours to get back to our homes in Omsk, Russia.

We made over 10,000 QSOs during the DXpedition, with 140 DXCC countries on SSB and CW, including the WARC bands. The following totals will tell the story: 80m—504; 40m—2061; 30m—463; 20m 5063; 17m—431; and 15m—1557.

In conclusion, we wish to thank all of the hams who worked us, and we are especially obliged to our QSL managers, Ken KC4UG and Walter DK8FS for spiritual and material support. We also want to thank MFJ Enterprises in Mississippi for the 1278 multimode controllers, which helped us to make plans for the DXpedition.

[Many thanks to Ken Carpenter KC4UG, PO Box 586, Vernon AL 35592, for this report from Mike and group. Ken reports that he has operated Mike's home station in Omsk and it is awesome, consisting of a TS-400, 2 kW amp, and seven elements on 15 and five elements on 20 meters. The antennas are on a tower on his 10-story apartment building. Ken would be glad to help arrange for a UA9M callsign for any who would like to travel in that direction. Mike's info is Mike Shakirov UA9MI, PO Box 2056, Omsk 644119, Russia.—Arnie]

Photo C. Picture of (L-R) Mike UA9MI, Alex UA9MR, Valery UA9NN, and Igor UA9MFW on Bering Island.

ISRAEL

Ron Gang 4X1MK
Kibbutz Urim
D. Negev 85530
Israel
Packet: 4X1MK @
4Z4YU.ISR.MDLE

Techsat, Israel's first amateur radio satellite project, continues full steam ahead at the Technion Technical University in Haifa. Launch of the bird, which will feature an orbiting packet radio mailbox for hams, is slated for 1995.

Its BBS software has already been written, and it should soon be in operation (terrestrially) from Bet Miller, home of the 4X4HF club, in Haifa. This will give people a taste of what it will be like connecting to the bird and will no doubt whet their appetites for the real thing. The simulated satellite BBS will be on AFSK FM, at first on 1200 baud and later switching to the faster 9600 baud rate. As with the Mode J type of operation slated for the satellite, those wishing to connect to the BBS will transmit on 2 metres and receive on 70 centimetres. The computer for this project has been donated by the Haifa Rotary Club. In a future report, we hope to have a more detailed re-

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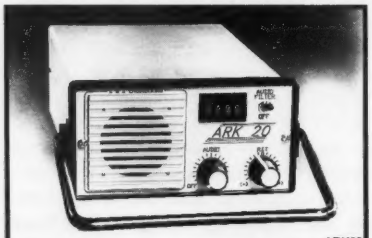

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CIRCLE 18 ON READER SERVICE CARD

port from some of the hams involved in the project.

With the sword of Damocles hanging over the wholeness of the 70 centimetre band, hams are beginning to wake up. In the last few weeks, three packet BBSs have been hastily set up on the band: on 430.400 MHz, a port of 4X4HF in Haifa; 433.450, 4X1RU in Herzliya (both of these part of the 4XNet and World-Wide Packet system) and 4X6SL in Tel-Aviv on 433.625, a private BBS on the air every evening, chock full of files and public domain software. All of these BBSs are working on standard 1200 baud.

By the time you read this, there should be a new UHF FM repeater activated in Jerusalem, and one is planned for Beersheva as well. What's in store for 70 centimetres in Israel? Is its fate sealed? To be continued . . .

[More next month when space permits.—Arnie]

REPUBLIC OF KOREA

Byong-Joo Cho HL5AP
Room 401 CQ Building
157-7 Kwangan-2Dong, Nam-Ku
Pusan 608-102
Korea

Korea was proud to announce that EXPO '93, the Taejon International Exposition, will be held in Taedok Science Town, Taejon City, from August 7 to November 7, 1993. The theme is "The Challenge of a New Road to Developing" with a subtheme of "Traditional and Modern Technologies for the Developing World, toward improved use and recycling of resources."

The Taejon International Exposition and the Korean Amateur Radio League (KARL) are co-sponsoring an award, appropriately named the "EXPO '93 Award," that is available to all amateur radio stations and SWLs all over the world. Further information can be received from, and applications sent to: Award Desk, Korean Amateur Radio League, C.P.O. Box 162, Seoul, 100-601, Korea.

There will also be a Special Event Station set up at the EXPO. The callsign will be 6K93EXP during the EXPO '93 run. I am happy to report that I will spend some time at the operator's position and will be very happy to say "Hi" to my many friends.

"With the sword of Damocles hanging over the wholeness of the 70 centimetre band, hams are beginning to wake up."

RUSSIA

Gennady Kolmakov UA9MA
PO Box 341
Omsk-99
Russia

There are serious troubles looming on the horizon for the amateurs of the former USSR. Obsessed with "market economy," people in charge of Amateur Radio Service on the government level have imposed (or will impose very soon) substantial fees for the privilege of operating on the air.

A First Class license (equivalent of the U.S. Extra) will cost a ham 120 rubles per annum. To enter any contests, one would fork over 240 rubles per year in addition to the above. It won't matter if you run 100 watts or 10 kW. Special calls call for yet more money. In U.S. currency this doesn't look like much ($1 = 500 rubles), but it sets a dangerous pattern—pay for what once was free and expect an increase any time. The opinions of ham ops were never requested, it seems.

In addition, getting contest certificates via the bureau would cost five rubles, receiving a single card via the bureau now costs 50 kopecks, sending a single card abroad via the bureau would cost two rubles 15 kopecks.

An airmail letter from Russia to anywhere in the world now costs 75 rubles. Since the majority of hams can't afford to send airmail letters (the average salary now stands at 3,000-4,000 rubles per month) in quantity, and because the foreign mail isn't getting through to Russia, those U-cards will become very rare indeed very soon. Moscow hams report piles upon piles of incoming QSLs at Box 88 that don't and won't get processed. The bureau is broke, can't pay employees and its own mailing expenses. Again, hold onto your CIS cards, don't mail them over here until the situation is resolved.

On a related subject, January 1993 was set as a time frame for the changeover of current amateur callsign allocations to a new system. 95% of all Ukrainian calls will change and a substantial amount of Russian calls, if the new system is implemented. Other republics will see a full 100% change of existing calls. As was announced earlier, the new allocations were assigned without any consultations with hams, thus the amateur community of the former USSR republics is in a state of turmoil. Nobody knows what will take place, when and how. Letters were sent to the ITU, trying to stop the new assignments. Government offices responsible for communications were petitioned without any obvious results. There is talk about having hams retain the present callsign system, while commercial and utility calls would be converted. At this time, it is all pure speculation and no decisions on this explosive topic were rendered. There would be no special calls assigned within the CIS for 1993, I was told, pending the outcome of the above.

As always, I will provide more details as they become available. 73 de UA9MA.

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202. KW2D
203. VE1HA
204. HP8BSZ
205. IK8JJQ
206. YC3DKN
207. I3VKW
208. K2EWA
209. KD3CR
210. N9GDG
211. KF8K
212. FD1BEG
213. DU1DZA
214. N8IMZ
215. KK4YA
216. LU1JDL
217. KA8YYZ
218. KA4TMJ
219. WA9DDC
220. YI1CIS
221. YC3FNL
222. G0FWG
223. KV4B
224. N5IET
225. WA9WIG
226. N3CDA
227. KE6KT
228. IK7DBB
229. JY5EC
230. N1ETT
231. PY2DBU
232. I8IYW
233. N0ISL
234. KC4BEB
235. WA7QQI
236. KA1RJG
237. OZ9BX
238. KB4HBH
239. KA3RWP
240. NJIT
241. W4DCG
242. YC0RX
243. VE7OJ
244. AA4W
245. N9GMM
246. KB4HBH
247. KM4HF
248. CE1YI
249. KA1FVY
250. N2GVB
251. N2DAO
252. WF8E
253. YB0HZL
254. N5MBD
255. N4SNS
256. KA3TGY
257. JN3XLY
258. N4DUV
259. KA9MRU
260. KA4OTB
261. N4JED
262. AB4KA
263. WA7OET
264. KA3RVH
265. CE7ZK
266. NI9J
267. WB9PTN
268. KB8DAE
269. W0CL
270. WB7VUB
271. JF6TUU
272. ZY3IO
273. KB4VIR
274. OE6CLD
275. N7JJQ/DU3
276. KK4KK4FB
277. DU1AUJ
278. K2EWB
279. NI5D
280. N2JXC
281. N0IWT
282. WB3BDH
283. K1CVF
284. KA3CXG
285. KA1SPO
286. WA4NWT
287. KJ4OI
288. KA3UNQ
289. WB2VMV
290. KD4MM
291. OE3DHS
292. KD9HT
293. DL8OBC
294. G3KVA
295. WA4NEL
296. KA4VZO
297. N0IDT
298. KA1FUE
299. KD7EO
300. JH8MWW
301. KB8ICD
302. JA1CKE
303. N3GEE
304. JA5MG
305. KA1FTU
306. WA8KMK
307. N2IBW
308. N4THE
309. N3CYD
310. JA4TF
311. W6YLL
312. WA1S
313. KC5WA
314. N6WK
315. PY4OY
316. KG7BO
317. WB3FQY
318. WC0A
319. VE4AMU
320. YC0MCA
321. WA3LEU
322. KB2GLO
323. OZ1FNX
324. K6GCF
325. KC4PCX
326. KA7EXD
327. DK9EA
328. HL5AP
329. SM7BRO
330. ON6DP
331. VE1RJ
332. WA3KKO
333. KB9ABI
334. DA2UI
335. SM0BNK
336. WA2BMQ
337. WA0QIT
338. 5Z4BH
339. KB9ALG
340. OA4ANR
341. OD5ZZ
342. VE3ZD
343. LU-2ATR
344. HL5FRG
345. UB5LRS
346. N1ICC
347. IK4NPC
348. LU3CF
349. G7AZP
350. VE5AAD
351. SM4SEF
352. N9CPK
353. KO4VO
354. JE1GWO
355. IK1SLE
356. JF7QUE
357. N7QXQ
358. JE6KLR
359. N2BI
360. KK4XL
361. JA3SSB
362. KB0ADI
363. N8MOT
364. KB2NEK
365. WB2PPN
366. AB4ZD

150 COUNTRIES ENDORSEMENT

1. WB2DIN
2. N4WF
3. N6GCB
4. K9FD
5. N0AFW
6. N3II
7. WB1BVQ
8. KA2AOT
9. KI6GI
10. N7GMT
11. IK8GCS
12. IK1APP
13. VE6JO
14. VE4ACF
15. WB4I
16. IK1IYU
17. KE2CG
18. G3IZQ/W1
19. WB6FNI
20. K8MDU
21. VE6VK
22. KB6IUA
23. WB5FXT
24. YU2EJU
25. IK5IIU
26. KE8LM
27. KA1ION
28. KA6SPQ
29. W6MVV
30. JA8CAQ
31. KI6WF
32. JA0SU
33. WD5N
34. W2SV
35. W6BCQ
36. F6IFE
37. VE2MFD
38. WP4AFA
39. 5N0WRE
40. KD2WQ
41. VE1ACK
42. N5JUJ
43. 9Q5NW
44. KB8BHE
45. I3VKW
46. KD3CR
47. N8IMZ
48. G0FWG
49. N2FPB
50. KE6KT
51. OZ9BX
52. NJ1T
53. CE1YI
54. YB0HZL
55. JN3XLY
56. KA9MRU
57. CE7ZK
58. KB8DAE
59. K2EWB
60. NI5D
61. KD3CQ
62. KA4OTB
63. WB2VMV
64. KD4MM
65. KD9HT
66. KA3NIL
67. N0IDT
68. KA1TFU
69. KA4TMJ
70. JA4TF
71. KA3UNQ
72. KB8ZM
73. K2EWA
74. WA1S
75. PY4OY
76. WC0A
77. OZ1FNX
78. KA7EXD
79. ON6DP
80. VE1RJ
90. N6WK
91. WA3KKO
92. KB9ABI
93. SM0BNK
94. WA0QIT
95. 5Z4BH
96. OA4ANR
97. OD5ZZ
98. VE3ZD
99. HL5FRG
100. UB5LRS
101. PS7AB
102. KD1CT
103. DU1CHD
105. IK3ITX
106. VE2JWK
107. N7JXS
108. JM2PRM
109. HL5BUV
110. VE3GLX
111. KK6JY
112. EA6AAK
113. N3IHS
114. WA2CKP

200 COUNTRIES ENDORSEMENT

1. N3II
2. WB2DIN
3. K9FD
4. IK8GCS
5. N0AFW
6. WB1BVQ
7. VE4ACF
8. KI6GI
9. N6GCB
10. K8MDU
11. YU2EJU
12. KE8LM
13. WD5N
14. F6IFE
15. 5N0WRE
16. KE2CG
17. I3VKW
18. CE1YI
19. W6BCQ
20. CE7ZK
21. KB8DAE
22. K2EWB
23. KD3CQ
24. KD4MM
25. KD9HT
26. KA4TMJ
27. N7GMT
28. JA4TF
29. K2EWA
30. WA1S
31. PY4OY
32. ON6DP
33. VE1RJ
34. WA3KKO
35. WA0QIT
36. 5Z4BH
37. HL5FRG
38. JAI-20762/BV

250 COUNTRIES ENDORSEMENT

1. WB2DIN
2. IK8GCS
3. WD5N
4. K8MDU
5. KE2CG
6. CE1YI
7. CE7ZK
8. K2EWB
9. KD9HT
10. N7GMT
11. KD3CQ
12. KB8DAE
13. WA1S
14. PY4OY
15. VE1RJ
16. 5Z4BH
17. N2BI
18. I750156

300 COUNTRIES ENDORSEMENT

1. WB2DIN
2. IK8GCS
3. K2EWB
4. K8MDU
5. N7GMT
6. WA1S
7. PY4OY
8. KD3CQ
9. VE1RJ
10. UY5XE
11. IK3ITX
12. VU2SMN

350 COUNTRIES ENDORSEMENT

1. WB2DIN
2. PY4OY
3. UB4WZA

HAM HELP

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We are happy to provide Ham Help listings free on a space available basis. To make our job easier and to ensure that your listing is correct, please type or print your request clearly, double spaced, on a full 8 1/2" x 11" sheet of paper. Use upper- and lower-case letters where appropriate. Also, print numbers carefully—a 1, for example, can be misread as the letters l or i, or even the number 7. You may also upload a listing as E-mail to Sysop to the 73 BBS, (603) 924-9343, (8 data bits, 0 parity, 1 stop bit, 2400 baud), on Special Events Message Area #11. Specifically mention that your message is for publication. Please remember to acknowledge responses to your requests. Thank you for your cooperation.

Needed: Information on Tecraft Criterion series NU-VERTER Model 144, IF Freq. 14-18 mc. Thanks. *Art Coulombe W7HGK, 21 Yakima St., Walla Walla WA 99362.*

I'd like to exchange schematics/project ideas with other homebrewers. Please send a list of your projects, and I'll send a list of mine; or if you don't have a list of your own, please send an SASE and I'll send you a list of my projects (some have been published). *Klaus Spies, Lock Box 48185, Niles IL 60714-0185.*

Wanted: Knight R100A Receiver. Thank you. *Walter J. Stanis, Box 231347, San Diego CA 92194.*

I need manual/assembly instructions/schematic for VHF Engineering "Synthesizer II." This was how you made a rig programmable in the '70s. Will pay reasonable copy costs. *Joel S. Look W1KCR, 35 Goff Ave. Apt. 507, Pawtucket RI 02860.*

Wanted: Source info of antenna materials, such as tubing of various lengths and diameters; various types of element insulators; whip antenna rod material (such as one would find in commercially available HAM units). Ham is involved in the designing, experimenting and building of antennas. *Ron Zemljak N7LDQ, 140 Maude 'S' Canyon, Butte MT 59701.*

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SPECIAL EVENTS

Ham Doings Around the World

Listings are free of charge as space permits. Please send us your Special Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the January issue, we should receive it by October 31. Provide a clear, concise summary of the essential details about your Special Event. Check ***Special Events File Area #11*** *on our* ***BBS (603-924-9343)****, for listings that were too late to get into publication.*

OCT 2-3

VIRGINIA BEACH, VA Tidewater Radio Conventions, Inc., will present their 18th annual Virginia Beach Hamfest and Computer Fair/ARRL Virginia State Convention/Popular Communications SWL Convention, at the Virginia Beach Pavilion from 9 AM-5 PM Sat., and 9 AM-4 PM Sun. Speakers are Gordon West WB6NOA, and Roy Neal K6DUE. VE Exams, Flea Market, Tailgating, Forums, and more. Talk-in on 146.97. Order tickets (with SASE) from *Manny Steiner K4DOR, 3512 Olympia Ln., Virginia Beach VA 23452. Tel. (804) 340-6105.* Get Commercial info from *Lewis Steingold W4BLO, 1008 Crabbers Cove Ln., Virginia Beach, VA 23452. Tel. (804) 486-3800.*

OCT 3

ASHLAND, OH The North Central Ohio Hamfest will be held from 8 AM-3 PM at Ashland County Fairgrounds. Flea Market. Forums. 2m Foxhunt. Talk-in on 147.105+. Contact *Wally Green, 3 East Liberty St., Ashland OH 44805. Tel. (419) 281-3903.*

WARRINGTON, PA The Mt. Airy VHF Radio Club, Inc., (Pack Rats) will sponsor their Hamarama at the Rt. 611 Drive In. Talk-in on 146.52 (simplex). Gates open at 7 AM. Set-up at 6 AM. Contact *K3EOD, (215) 742-3312.*

OCT 8-9

AUGUSTA, GA The ARC of Augusta will sponsor a Special Event at the Augusta College Sports Complex, 3109 Wrightsboro Rd., from 6 PM-9 PM Fri.; 8 AM-5 PM Sat. Flea Market, VE Exams, Forums, Demos. Talk-in on 144.89/145.49, alt. 144.51/145.11. For tickets, tables, send check and SASE to *ARC of Augusta, P.O. Box 3072, Augusta GA 30914-3072.* For info, call *Ed Butorajac KM4QQ, (706) 798-1918.*

OCT 9

BELTON, TX Ham Expo '93 will be held by the Temple ARC, at the Expo Center in Belton, from 7 AM-2 PM. VE Exams. Free Test Bench. Transmitter Hunt. Call *Eric N5WFU, (817) 986-1257* or *Mike WA5EQQ, (817) 773-4768.* Write to *Temple ARC, 2014 S. 53rd, Temple TX 76504.*

LIMA, OH The Northwest Ohio ARC will host a Hamfest at the Allen County Fairgrounds. Contact *WB8BND, P.O. Box 211, Lima OH 45802.* VE Exams; pre-register with completed 610 and fee of $5.60 to *ARRL-VEC, W8TY, 1370 N. Stevick Rd., Lima OH 45807.*

TEANECK, NJ The Bergen ARA will hold its annual Fall Hamfest from 8 AM-2 PM at Fairleigh Dickinson Univ. Contact *Jim Joyce K2ZO, (201) 664-6725, before 10 PM.* FCC VE Exams; contact *BARA VE Hotline, (201) 797-0151 before 10 PM.* Talk-in on 146.190/.790 and 145.620 simplex.

TITUSVILLE, FL A Hamfest will be held at Sandpoint Park from 9 AM-5 PM, by the Titusville ARC. Advance registration is required. Contact *John Lowe KE4BBC, (407) 267-2000,* or *Bud Hughes K4CWG, (407) 267-3450.* Talk-in on 146.910 (-600 kHz).

OCT 9-10

EL PASO, TX The annual Internat'l Hamfiesta will be held at the Texas Nat'l Guard Bldg., 9100 Gateway Blvd., North, Sat. from 8 AM-5 PM; Sun. 8 AM-3 PM. Seminars. QCWA Breakfast. VE Exams both days. Talk-in on 146.88. Contact *Milly Wise W5OVH, P.O. Box 31628, El Paso TX 79931. Tel. (915) 751-4160.*

MEMPHIS, TN MemFest '93 Greater Memphis Amateur Radio and Computer Show, will be held at Shelby Farms Show Place Arena, 105 Germantown Road So., by the Mid-South ARA. Time: Sat. 9 AM-4 PM; Sun. 9 AM-2 PM. VE Exams both days, 9 AM-Noon. Flea Market Info: *Steve Cheeseman NX3W, 3290 New Getwell Suite 202, Memphis TN 38118. Tel. (901) 365-6621 (W); (901) 368-6781 (H).* General and Exhibitor Info: *Nita Wofford N4DON, 2966 Cordell, Memphis TN 38118. Tel. (901) 363-4971.*

OCT 10

DURHAM, CT The Meriden ARC, the Middlesex ARS, and the Shoreline ARC, will jointly sponsor the "Nutmeg Hamfest" at the Fairgrounds in Durham. VE Exams. Talk-in on 147.96/.36. Contact *Jim McCandless N1IZF, (203) 349-3353, 6 PM-10 PM; packet: N1IZF @ W1NRG.CT.USA.NOAM. Mail: P.O. Box 193, Durham CT 06422.*

WALL TOWNSHIP, NJ The 6th annual Shore Area Ham and Computerfest, sponsored jointly by the Jersey Shore ARA (JSARS), Neptune ARA, Ocean-Monmouth ARC (OMARC), and Garden State ARA (GSARA), will be held at the Allaire Airport. Doors open 0800-1600. VE Exams. Talk-in on 145.110 (NK2O) for cars; UNICOM 123.00 MHz for aircraft. Get details from *Al Jackson NK2O, (908) 922-8121.* For tables/tickets, write to *Shore Area Hamfest, P.O. Box 635, Eatontown NJ 07724-0635.*

WAUKESHA, WI The Kettle Moraine RAC Inc., will hold its 15th annual Ham and Computer Swapfest at the Waukesha County Exposition Center, Hwys J & FT. Doors open 8 AM-1 PM. VE Exams by the Badger Examiners. Advance tickets $4; 4' tables $5; send a SASE and check payable to *KMRA Swapfest, P.O. Box 411, Waukesha WI 53187-0411.*

OCT 16

FRANKLIN, PA The Fort Venango Mike & Key Club will hold a Ham Auction/Flea Market at the Venango County 4-H Fairgrounds, RT # 62, starting at 8 AM. Auction begins at 10 AM. Talk-in on 147.12+, 145.23-, and 145.19- MHz. Contact *Jerry Almes W3DTW, (814) 432-3647,* or *Bruno Wolozyn K3MHB, (814) 677-8694.* Or write to *The Ft. Venango Mike & Key Club, RD #1, P.O. Box 591, Cranberry PA 16319.*

GRAND FORKS, ND Forx ARC will sponsor a Hamfest at Grand Forks Civic Auditorium, 615-1 Ave. N., beginning at 8 AM. VE Exams at 10 AM, walk-ins welcome. Talk-in on 146.94. Contact *Bob Smith ND1H, 1203 Shakespeare Rd., Grand Forks ND. Tel. (701) 746-9498.*

GRAY, TN The 13th annual Tri-Cities Hamfest will be held at the Appalachian Fair Grounds, located off I-181 in Gray. Flea Market. Sponsors: Kingsport, Bristol, and Johnson City Radio Clubs. Mail inquiries to *Tri-Cities Hamfest, P.O. Box 3682 CRS, Johnson City TN 37602.*

SANFORD, NC A Fall Festival will be held from 8 AM-4 PM by the Central Carolina ARS. Location: Lions Club Fairgrounds, 7th & Weatherspoon Sts. Contact *April Maggart KD4QMU, 8512 Deep River Rd., Sanford NC 27330.*

STARKE, FL Bradford County Fairgrounds, US 301 North of Starke, will be the location for the 3rd annual Starke Hamfest, sponsored by the ARC - Bradford Area. Time: 0800-1600 hrs. Talk-in on 145.150- and 146.520 simplex. Contact *Donna KC4MXK, (904) 964-9491,* or *Tony WB2FGL, (904) 964-9328.* For reservations, make check payable to *ARC - Bradford Area, c/o Tony Spatafore WB2FGL, P.O. Box 852, Starke FL 32091.*

OCT 17

CAMBRIDGE, MA A Tailgate Electronics, Computer and Amateur Radio Flea Market will be held from 9 AM-2 PM at Albany and Main Sts. Call *(617) 253-3776.* Mail reservations before Oct. 5th to *W1GSL, P.O. Box 82 MIT BR., Cambridge MA 02139.* Sponsors: MIT Radio Soc., and the Harvard Wireless Club. Talk-in on 146.52 and 449.725/444.725 pl 2A W1XM/R.

CENTRALIA, IL The Centralia Wireless Assn., Inc., will hold its annual Hamfest at the Kaskaskia College Gym, 3 mi. NW of Centralia. Doors open at 8 AM. Talk-in on 147.27/.87 and 443.2/448.2. VE Exams at 11 AM, walk-ins accepted. Contact *Bud King WA9U, (618) 532-6606.* Mail ticket orders with an SASE to *Centralia Wireless Assn., Inc., Hamfest Tickets, P.O. Box 1166, Centralia IL 62801.*

MILAN, OH The firelands Area Repeater Assn. will hold their 2nd annual Hamfest at the Ehove Career Center, from 8 AM-4 PM. Talk-in on WB8LLY Rptr. 146.805. Contact *Carol Richards AI8V, (419) 433-6624.*

TUCSON, AZ The 5th annual Tucson Hamfest, sponsored by Old Pueblo RC, ARRL, ARCA, will be held from 7 AM-1 PM at DeAnza Drive-In, 22nd St. & Alvernon Way. Talk-in on 146.22/.82, 146.28/.88, and 146.52 simplex. Contact *A.J. Pawlowski KB7KZ, 3418 W. Green Trees Dr., Tucson AZ 85741. Tel. (602) 742-2605*

OCT 23

SUMTER, SC The Sumter ARA will present their 7th annual Hamfest and South Carolina's 1993 ARRL Convention, from 8 AM-4 PM at Sumter County Exhibition Center, 700 W. Liberty St. VE Exams for Walk-ins Only. For VE Exam info, call *Dan Mask WB5SGH, (803) 775-9106.* Dealers, call *Hap Griffin WA4UMU, (803) 469-6381.* For written info, write to *S.A.R.A. - Hamfest, P.O. Box 193, Sumter SC 29150.*

OCT 23-24

CHATTANOOGA, TN The Hamfest Chattanooga Amateur Radio & Computer Convention will be sponsored by the Chattanooga ARC, Sat. 9 AM-5 PM; Sun. 9 AM-3 PM. Talk-in on 146.19/.79. General info contact *Charles E. Curle AD4F, 8719 Snow Hill Rd., Ooltewah TN 37363.* Dealer info/reservations: *Barbarra Gregory, 8619 Smokerise Ln., Chattanooga TN 37421. Tel. (nights) (615) 892-8889.* Flea Market info: *Lou Carter, 107 South Bragg Ave., Lookout Mountain TN 37350. Tel. (nights) (615) 821-4043.*

MOBILE, AL The Mobile ARC will hold a Ham and Computer Fest at Abba Shrine Temple, 7700 Hitt Rd., off Shillinger Rd. Time: Sat. 8 AM-4 PM; Sun. 8 AM-3 PM. VE Exams both days at 9 AM. Contact *Louis AC4EN.* Talk-in on 146.82/.22. Rag-Chew 149.94/.34. For details, call *Richard Ireland KD4TTD, (205) 824-2749,* or write *M.A.R.C., P.O. Box 81791, Mobile AL 36689.*

PALM BEACH, FL The West Palm Beach ARC will sponsor their 1st annual High Speed CW Contest, beginning at 1 PM at the Palm Beach County Fairgrounds. For details, contact *Ted Herrman AE8G, 301 North M St., Lake Worth FL 33460. Tel. (407) 586-7940; FAX (407) 585-3466.*

OCT 24

GOLDEN, CO The Rocky Mountain Radio League, Inc., will present the 1993 RMRL Hamfest from 8 AM-2 PM at Jefferson County Fairgrounds, 15200 W. 6th Ave. VE Exams. ARRL Forum. Talk-in on 144.62/145.22 MHz. Contact *Joe Dickinson WT0C, (303) 795-3397.*

WARREN, MI The Utica Shelby Emergency Comm. Assn. will hold their USECA Swap from 8 AM-2 PM, at Student Community Center (K-Bldg.), Macomb Community College, South Campus. VE Exams (pre-registration required) call *Bill N8CVC, (313) 468-8345.* Table info: *Dave N8OEV, (313) 792-0791;* or *Virginia N8NLS, (313) 268-0691.* Talk-in on 147.18+, 147.42 simplex. For Club info, call *Dave KF8CT, (313) 268-6730.* Mail pre-registration payments with an SASE to *Virginia Przekaka N8NLS, 34473 Coachwood, Sterling Hts MI 48312.*

WESTMINSTER, MD The Radio Clubs of Carroll County MD and Penn-Mar PA, will be holding the 4th annual Mason-Dixon Computer & Hamfest at the Carroll County Ag Center, starting at 8 AM. VE Exam registration begins at 8 AM; pre-registration requested; contact *Page Evans NE3P, (717) 359-7610.*

OCT 30

EAST LYME, CT The Tri-City ARC will hold its annual Fall Auction at the Senior Citizens Center, Waterford Municipal Complex, from 10 AM till sold out. Bring your equipment to be auctioned. Talk-in on 146.07/.67 Rptr. For info call *KA1BB at (203) 739-8016.*

FREDERICKSBURG, VA VE Exams will be given at the Rappahannock Library in Fredericksburg. For details, call *AC4SK at (703) 373-7076,* or *AC4MB at (703) 891-5581.*

ST. PAUL, MN The Hamfest Minnesota & Computer Expo, sponsored by the Twin Cities FM Club, will be held in the Main Arena at the St. Paul Civic Center, 143 West 4th St.: Flea Market. VE Exams. Educational and Fun Seminars. Talk-in on

146.16/.76 Rptr. For info, write to *Twin Cities FM Club, P.O. Box 5598, Hopkins MI 55343*, or call the *Hamfest Minnesota Info Line, (612) 535-0637.*

OCT 31

LEBANON, IN The Boone & Clinton County ARCs will co-sponsor a Hamfest from 8 AM-4 PM at the Boone County 4-H Fairgrounds, Warm & Dry Community Bldg. Flea Market. VE Exams near by. Talk-in on 147.105 and 443.150. Contact *Tim French KA9WDJ, (317) 324-2618; Don Jackman N9ILX, (317) 482-5211*; or *Don Lecklitner N9GBO, (317) 654-6580.* Or write to *Boone County ARC, P.O. Box 186, Lebanon IN 46052.*

MARION, OH The Marion ARC will present its 19th annual "Heart of Ohio Hamfiesta and Computer Show" at the Marion County Fairgrounds Coliseum, from 8 AM-3 PM. Talk-in on 147.90/.30 Rptr. Contact *Steve Eckard WS8S, 6583 South St. Meeker, Marion OH 43302. Tel. (614) 499-3565.*

NOV 6

CARTHAGE, MO The Carthage AR Soc. Hamfest will be held at the Carthage Memorial Hall at the intersection of Oak & Garrison Sts., from 8 AM-1 PM. Talk-in on 147.42 simplex. Contact *Jim Dixon WX0J*, or write to *Carthage ARC, P.O. Box 783, Carthage MO 64836. Tel. (417) 358-4126.*

COOKEVILLE, TN The Cookeville Rptr. Assn. and The Tennesee Tech ARS will co-sponsor the 3rd annual Cookeville Hamfest at Hooper Eblen Center on the campus of TTU. Time: 8 AM-4 PM. Talk-in on 147.21+. VE Exams at 10 AM. Contact *Rich KD4ABC, (615) 528-7171* or *TTARS, WA4UCE, TTU Box 5262, Cookeville TN 38505. Tel. (615) 372-3043.*

ENID, OK Hoover Bldg., Garfield County Fairgrounds at Oxford St. and N. 4th, is the location for a Hamfest being sponsored by the Enid ARC. VE Exams at 10 AM (walk-ins welcome). Talk-in on 145.29/144.69. Contact *Fred N5QJX, (405) 242-3551*, or *Tom N5LWT, (405) 233-8473.*

EUSTIS, FL The Lake AR Assn. will hold their annual Hamfest and Electronics Expo at the Lake County Fairgrounds from 9 AM-5 PM. W5YI Testing for all classes, starting at 1 PM. Radio and ATV Demos. Contact *Cole A. Ruck KC4UIG, (407) 273-1624 (eves)*; or *Pat Paris WD4LXN, (904) 669-7279 (eves).*

FERNDALE, WA The Washington Mt. Baker ARC Flea Market will be held from 9 AM-4 PM at Ferndale Band Boosters Bingo Hall, NW corner of Interstate 5 and Smith Rd. overpass. VE Exams. Contact *Terry Andrew VE7BUS/W7, 1009 Glenning St., Lynden WA 98264. Tel. (206) 354-5868.*

MILWAUKEE, WI The Milwaukee Repeater Club will sponsor the 9th annual "6.91 Friendly Fest" from 8 AM-Noon at St. John the Evangelist Congregation, 8500 W. Cold Spring Rd. Talk-in on 146.91- and on 146.52. VE Exams. Contact *The Milwaukee Repeater Club, P.O. Box 2123, Milwaukee WI 53201.* Reservation deadline Oct. 28th.

NOV 6-7

LONG ISLAND, NY "HamExpo '93 Weekend" and ARRL Section Convention, sponsored by the Radio Central ARC, will be held at Suffolk Community College from 9 AM-4 PM. Flea Market. Computer Show. VE Exams, and more. Group hotel rates. Talk-in on 145.150-4Z or 449.525-2A. Contact *Valerie DeRicco N2NYB, (516) 874-3669* or *John Mark KB2QQ, (516) 689-6343.*

SPECIAL EVENT STATIONS

OCT 2

ALAMOGORDO, NM The Alamogordo ARC will conduct their 3rd Special Event operation, sponsored by the International Space Hall of Fame, to honor new inductees. Station WA5IPS will operate from atop the Space Hall. Frequencies: SSB - 28.480/.490 MHz from 1600-1800 UTC; General phone bands on 15 and 20 meters from 1800-2300 UTC. We will operate in the 20 meter phone band if propagation is poor. Special QSLs will be sent from the Space Hall of Fame and will be certified by A.A.R.C. members. Mail QSL requests to *International Space Hall of Fame, Route 2001 - P.O. Box 533, Alamogordo NM 88311-0533.* SWL requests will be honored.

MATOON, IL The Moultrie ARC will operate W9BIL to commemorate the annual Chocolate Harvest Celebration. Operation will be in the General 40, 20, and 15 meter bands, and the Novice 10 meter subband. For a certificate, send QSL and a SASE to *Bryon Abrams KB9BWS, P.O. Box 242, Findlay IL 62534-0240.*

RICHARDSON, TX The Alcatel ARA will operate Station N5TBQ (Texas Best Quality) 1500Z-2100Z, from the Open House site of Alcatel Network Systems, Inc. Operation will be in the General phone portions of 40, 20, 15, and 10 meters. For a unique QSL card, send contact report to *Alcatel Network Systems, Inc., AARA, M/S 401-212, 1225 North Alma Rd., Richardson TX 75081-2206.*

OCT 6-10

HILLSBOROUGH, NC The Orange County Radio Amateurs will commemorate the bicentennial of the founding of the Univ. of North Carolina at Chapel Hill. SE Stations will operate, with a /UNC suffix, on the lower 25 kHz of the General portions of the 80, 40, 20, and 15 meter bands SSB, from 2300Z-0300Z on Oct. 6-8. In addition to the above band segments, SSB operation on the lower 50 kHz of the Novice portion of 10 meters (propagation allowing), will take place Oct. 9-10, from 1200Z-0000Z. An 8 1/2" x 11" certificate will be endorsed for all bands worked, with a special endorsement for UNC graduates. For a certificate, mail an SASE to *David J. Snyder N2MLU, 600 S. Churton St., Apt. #66, Hillsborough NC 27278.*

OCT 9-10

CAMANO ISLAND, WA The 3rd annual "Slug, Oyster and DX Festival" honors our friends the Mollusks, and is sponsored by the West Seattle ARC (W7AW). Operation will be Oct. 9 1500-0400 UTC to Oct. 10, 1500-2100 UTC. Frequencies: 21.052 MHz CW, 14.235 MHz SSB, 7.045 MHZ CW, 3.930 MHz SSB. For a colorful certificate showing a slug and oyster at play, send your QSL and a large SASE to *West Seattle ARC, c/o F. Tate, 10230 4th Ave. SW, Seattle WA 98146.*

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SAN GABRIEL MTNS., SO. CA The 3rd annual "Mountain Top Mobile" will operate from Table Mountain, to celebrate radio for radio's sake. Operators: KC6TAZ, N6XOG, N6RNX, KM6TJ and N6PQB. QSL via individual operators (call followed by "Mountain Top Mobile").

TORRANCE, CA The South Bay ARC will operate KN6JN 1700Z-2400Z from the 2nd annual Torrance Air Fair in So. CA. Operations will be on General phone portions of 15 and 20 meters and Novice portion of 10 meters; also on 145.77 simplex and 224.38 rptr. For a certificate, send QSL and 9" x 12" SASE to *SBARC, P.O. Box 536, Torrance CA 90508.*

OCT 15-16

ST. LAWRENCE COUNTY, NY The North Country ARC will operate N2PSL to commemorate the Founding of the NCARC. Operation will be in the lower 25 kHz of the General portion of 80, 40, 20 meters, and the 10 meter Novice subband. For a QSL, send QSL and SASE to *NCARC, c/o Pete Baltradis N2IJW, Rt. 1 Box 206, Norwood NY 13668 USA.*

OCT 15-17

UNION, KY The Northern Kentucky ARC will operate K4CO 1400Z-2200Z from Big Bone Lick State Park, in conjunction with the annual Salt Festival. Operation will be on 40, 20, and 10 meters; also, 146.375+ Rptr. For a certificate, send 4" x 9" SASE and contact number to *NKARC, P.O. Box 1062, Covington KY 41012-1062.*

OCT 16

SAN BERNADINO, CA The Citrus Belt ARC will be operating Station W6JBT from the Patton State Hosp., to commemorate the admission of the first patient to the hospital 100 years ago. Operation will be from 1500 UTC Oct. 16th-1500 UTC Oct. 17th. Frequencies: Phone - 7.270, 14.270, 21.350, 28.350; 145.850 144-148 MHz band; 224.860 222-225 MHz band. For a certificate, send QSL and a 9" x 12" SASE to *Citrus Belt ARC, P.O. Box 3788, San Bernardino CA 92413-3788.*

SANTA ROSA ISLAND, FL The Serious Hams ARC will operate N4MAD from Ft. Pickens State Park 1200Z-2000Z on 40, 20, 15, and 10 meters in the CW and voice portions of the bands, near the lower edge of the General portion of each band. Santa Rosa Island is IOTA-142. For a special QSL, send SASE and contact number to *AD4BU, 10697 Bridge Creek Dr., Pensacola FL 32506.*

OCT 16-17

DETROIT, MI The Wayne County ARPSC will operate WY3Q/8 from 1400Z Oct. 16-2200Z Oct. 17, to commemorate the 16th annual running of the Detroit Free Press/Mazda Internat'l Marathon. Operation will be in the General 80-15 meter phone subbands and the Novice phone subbands on 10 meters. For a QSL card, send QSL and SASE to *Bill Gilbert, 222 Cleveland, Trenton MI 48183.*

OCT 16-23

FORT WORTH, TX The Menasco ARC will be on the air as a special event Station celebrating Menasco Aerosystems' 37 years of operating in the State of Texas. Operation will be at 28.425 and 21.060 or 21.125 plus or minus QRM. To receive a special 8 1/2" x 11" certificate, send a large SASE to the control operator.

OCT 20-22

NEW YORK CITY, NY The "22 Crew" will operate WB2JKJ from the HQ of the Radio Club of Junior HS 22, to celebrate the 13th Anniversary of NYC's largest Ham Club and EDUCOM (Education Thru Communication). Join them on 7.238 MHz. from 1200-1300 UTC, then on to 21.395 till 2000 UTC, Oct. 20-22. For an outrageous QSL and surprise package, write to *RC of JHS 22, P.O. Box 1052, New York, NY 10002,* or FAX to *(516) 674-9600.*

OCT 23

EDISON, NJ The Piscataway ARC will operate Station AA2KS 1300Z-2200Z, to celebrate Edison's discovery of the electric light bulb. Operation will be on the General portion of 40, 20, 15 meters and Novice 10 meters. For a special QSL card send QSL and SASE to *Piscataway ARC, P.O. Box 1233, Piscataway NJ 08854.*

OCT 23-24

RIVERSIDE, CA The Moreno Valley ARA, Team March ARC, and the March Air Force Base MARS station will operate KI6GD during the March AFB Open House. Operations will be 1600Z-2200Z both days, on the General CW and phone sub-bands of 40, 20, and 15 meters. Also the Novice section of 10 meters. For a special certificate, send $100 and contact number to *MVARA, P.O. Box 7642, Moreno Valley CA 92552.* For more info, contact *MVARA or packet N6YIH@ N6YIH.#soca,ca,usa.na.*

OCT 30

ACCOMACK COUNTY, VA The OH-KY-IN ARS will activate an IOTA during the CQ WW contest. The operation will be on all bands. The ITA will be one of the offshore islands in Virginia. Activity during the contest will be from Chincoteague Island, NA83. On Oct. 28 there will be a one day operation from Asateague Island, NA139. The call used will be K8SCH/4. The QSL route for both will be *John Hugentober, Sr. N8FU, 4441 Andreas Ave., Cincinnati OH 45211.* Please enclose an SASE.

OCT 30-31

RIVERSIDE, CA Moreno Valley ARA, Team March ARC, and the March Air Force Base MARS station will operate KI6GD during the March AFB Open House. Operations will be 1600Z-2200Z both days, on the lower 25 kHz of the General subbands and Novice 10 meters. Operations will be SSB phone and CW; plus 145.560s and 146.655R pl 103.5. For a special USAF Certificate, send QSL and $1.00 to *MVARA, P.O. Box 7642, Moreno Valley CA 92552.*

OCT 31-NOV 1

BREVARD, NC The Transylvania County ARC will operate W4ZCB to celebrate Halloween from the Devil's Courthouse in Transylvania County. Operation will be from 2000Z Oct. 31-0200Z Nov. 1. Frequencies: 7.234, 14.295, 21.365, 28.335 SSB, and 146.52 FM simplex. For a certificate, send a legal size or 9" x 12" SASE to *Harold Johnson W4ZCB, 115 Kindy Forest Dr., Hendersonville NC 28739.*

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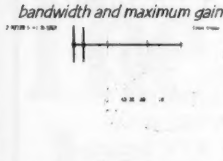

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NEVER SAY DIE

Continued from page 4

What do you talk about when you make a contact? Are you actually talking about anything, or is your mike fright so bad that all you can do is list the model numbers of your equipment and antennas, mention the weather, spell out your name and turn it back? Go get a life! For heaven's sake *do* something you can talk about! I don't give a damn what rig you're using. I don't care what brand of antenna you were able to afford. I don't care that it's raining. I want to know something about *you*.

No, I don't want to sit and listen while you rant about something you're emotionally disturbed about. That's no fun. But I would be interested in any interesting ham adventures you've had. If you've read my editorials for any time you know about everything I'm interested in. I'm into all kinds of hobbies and several active sports. I read a ton of books and magazines and will be most interested in anything you've read and found interesting that I might have missed. I love getting letters from readers giving me leads on books I'll enjoy reading or music I might enjoy hearing.

What I don't need is to get on a repeater where there's some resident retired old codger who rambles on endlessly about nothing, month after month. You've got one of those around, right? Heck, I'd even get bored listening to someone like this year's Ham O' The Year award winner and his obsession with me and my admittedly adventurous life. These old guys must have something that interests them other than ham radio. Or, if they have never done anything in their lives outside of hamming, isn't there something interesting they've done in amateur radio?

I've told you how much fun I had hamming from the demilitarized zone between North and South Korea as HL9WG, right? Or getting on the air as 7P8CA from Lesotho. You can surely get a good QSO going by asking if they've read what that arrogant, egotistical asshole Wayne Green wrote this month. Well, don't use those exact words. They might offend some Nervous Nelly listening in. We've enough garbage-mouth stuff going on without you contributing to the mess. The language you use on the air is a clear announcement of your class in society. After a few words we know right where you fit in, so if we hear you using bad language and fractured grammar, we wonder why you aren't on CB where you belong. How did an ignorant slob like that get a ham ticket? Maybe that code test isn't enough of an obstacle.

I suppose I'm preaching to the choir. The chaps who need my advice the most wouldn't read *73* if their life depended on it. Not with all that ARRL bashing they think I do. Of course they've never read *73*, so they're going by word of mouth about my writing.

I keep trying to get you to break loose and go on a DXpedition. That'll give you something interesting to talk about for years. You might even get into slow-scan just so you can show your slides. And I'll love watching 'em. Yes, I know, you can't afford anything like that. Unless you're really into poverty as a way of life, there are plenty of easy DXpedition places to visit and have the time of your life.

Heck, you can drive to Nova Scotia and take a boat or plane to St. Pierre for a surprisingly few bucks. It's a bargain place to visit and they love visiting hams. I'm frugal, and I've never cared much about making money, and hate spending it. At least on myself. I've spent millions helping other people start businesses.

The Caribbean is another bargain place to visit and there are a dozen or so fairly rare spots you can activate. You can get there in a day, so you don't even need to have more than a week off to have a ball. Try it. Then write and thank me for pushing you. Also, let's see an article for *73* or *Radio Fun*.

What are you into that you can talk about? Bicycling? Kayaking? Scuba? Roller blades? Ultra-lights? Para-planing? Rallying? Sky diving? Ballooning? Gliding? Model planes? You're not a one-dimensional person, are you?

Many years ago I suggested we set up some net times and frequencies for hams with similar interests to meet and talk. Nothing came of it. One problem with nets is that once you have more than two or three stations involved there's a reluctance to say much. The result is that a bunch of ops check into the net and say hello. And that's about it.

There's a weekly submariners net. I called in a couple times. Now, I've got hours of interesting submarine yarns to tell, but I never found an opportunity. So I stopped checking in. The net was on 20m, which meant that half of the checkins couldn't hear the other half, which puts a real chill on talking for any length of time. Interest groups should stick to 80m and maybe 160m, where everyone can hear everyone else. Or perhaps 2m via a repeater.

Always try to be your very best at anything you do. So when it comes to hamming, invest what it takes to make you the most interesting ham on the band to talk with. Work hard at it. Tape yourself and take the time to critique it. Be upbeat. No one likes a sour apple, so griping and negativeness will have people avoiding you the next time around. I get letters from hams who obviously are devoting their lives to making as many people unhappy as possible. I sure hate when I run into 'em on the air.

That last QSO . . . was that the very best you're able to do?

Trivia

One of the ham rags made a great big deal out of a TV production outfit

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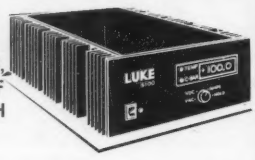

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that rented some 2m HTs instead of commercial frequency HTs from a commercial communications firm. They innocently used 'em. We'll eventually hear whether the rental company got conned when they bought the HTs or if they knew the frequencies were wrong. But shame on blaming the TV production company . . . another Chicken-Little hysterical reaction.

The ARRL vs. gays score seems to be gays 2, ARRL 0. The League backed down on their refusal to continue publishing classified ads solciting gay hams to join their movement. Now the gays, not satisfied with just winning, are suing for damages. Har-dehar . . . another item for the ``Only In America" record book.

Getting Involved

As a communications and technology expert, you should consider becoming involved in local activities. Business people, educators, politicians, and even your local bureaucrats are beginning to recognize that the information age is dawning on America and they'd better damn well get aboard or they're going to be left behind by the rest of the world.

They've been hearing John Scully, now the chairman of Apple, talk about the information highway of the future, while all most people can see right now is more like a cow path. They see that Singapore is setting about installing fiber optic cable into every home and business in the country. In France, every home has an on-line computer connected to a national data base.

We've been seeing the changes in our own lives as our ham repeaters have turned into cellular telephone systems. We've seen facsimile explode. Those of you who are awake have seen pocket communicators which handle voice and fax. We've seen national paging systems grow.

As a radio amateur, naturally you're expected by your neighbors to be an expert on communications and technology. Thus, when a few local politicians start getting concerned over the general ignorance of these highly technical matters, naturally they're going to turn to you for advice on how to get your county or state more tuned in with the future. Business people must find out how to take advantage of this technology and not be left behind by other parts of the country . . . or other countries. Schools must start turning out workers familiar with information and communications technology.

How prepared are you for this? How much do you know about what's available right now in technology, much less what's developing? Are you still sitting there, happily clacking away with your beloved old hand key, while the world is going to digital voice communications? And probably using spread-spectrum?

While we're communicating at 5 wpm by code, the world is moving to digital communications because digital radio provides about three times the coverage with a hundredth of the power. Further, it's easy to put 10 to 20 people all on one channel without mutual interference. Heck, they can even talk with each other, just as we do on the telephone. And, by using satellites in the link, the 10 to 20 people can be in 10 to 20 different countries. Yes, we could do all this via amateur radio, if we had anyone pioneering new technologies in our fraternity.

Alas, all too many hams prefer to remain fat, dumb, and happy. Ooops, make that fat, dumb, and unhappy . . . because they're forever grousing and kvetching on the air about things. Those damned no-coders. The rotten CBers. Lousy phone patches. Stinking pile-ups. Miserable contests crapping up the bands. That fathead and his little band of degenerates puking their venom on 14,313. The endless self-promotion broadcasts by an internationally famous ego case on 14,275. And worst, that awful Wayne Green! How can someone who sounds so nice on the air write such abrasive baloney?

I digress. My aim was to stir some deep feelings of guilt for the way you've wasted your ham life on inconsequentials. Well-deserved guilt. You've been skimming the cream and not paying your dues. That's pure American . . . get the most you can for the least effort. Never mind the hard work . . . a concept we left behind back in the 1950s. That's something those lousy, rotten Asians do when they sneak into our country and become successful, while we're gradually losing our quality of life.

Is change possible? Or are you too solidly inculcated with the baby-boom rationale? Are you too involved with TV, a little rag-chewing on the air, a rented movie once or twice a week, ball games, maybe some bowling? If I some way could find some people to write articles on new technologies that were written in a language you could understand, would you take the time to read 'em? Let me grind that one in a little harder. If I could get such articles and publish 'em, would you allocate a half hour or so at club meetings to discuss 'em? Okay, that's going too far. Maybe I should continue to publish feel-good articles and stop poking you with a stick.

When I point out that I'm not asking anyone to do something I haven't done myself, I get angry stares. Egotistical braggart. When I point out that it's exciting to get up on a mountain and make 10 GHz contacts with seven states . . . and that the equipment it takes is inexpensive and easy to build . . . I get shifty glances. I had a ball pioneering RTTY. Ditto SSTV. Ditto SSB. Ditto NBFM. It was fun learning. It was even more fun doing. And here we are in 1993 and there are more incredibly exciting horizons for us than ever before. Meanwhile, most hams seem to be looking backwards. Looking back fondly at Morse code, the

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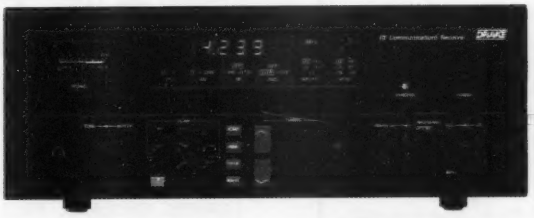

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communications medium of the 1920s and 1930s. Looking back lovingly at our archaic license structure, which is collapsing around us. Our national society is a radio relay league, aptly named when relaying was the only way to cover much distance by radio . . . around 80 years ago. Bummer.

New Hampshire and the 21st Century

An invitation came from Congressman Dick Swett (D-NH) to a meeting in nearby Keene proposing the organization of a 1994 National Information Technologies Conference at Keene State College. Swett spoke to (and with) the group via satellite video from Washington. We could see him, but the video was one way, so he couldn't see us. We could hear him just fine, but he had trouble hearing us, and then the audio link was lost.

There were around 25 business and education leaders present. We struggled to try and understand just what Swett or anyone involved in the project thought an Information Technologies Conference would involve . . . what the benefits would be and to whom . . . and who was going to pay for all this. There seemed to be a good deal of confusion about this. Swett read a long, prepared Beltway language speech . . . a lot about pro-activity. I'm pretty good at translating various American dialects into plain English, but I got lost. So did everyone else, fortunately. I'm not exactly sure what pro-activity is, but I'm all for it, and it describes me to a tee.

There were some vague references to information technology somehow benefiting local businesses, which is almost obvious enough not to have to be defended. And there was the need for Keene State College to start producing the information technology work force local businesses are going to need.

The hope was that Keene State and the local business leaders would work together to organize the conference. There was some mumbling about getting federal funding, but first they needed $50,000 from the business community as seed money to get the project started. This would take care of the next three months, when they hoped federal funding would kick in. Hmmm. Fifty big ones for three months? The obfuscation almost smothered us, but I think what they had in mind was sending someone or a small group around the world to look into information technology elsewhere. There was some mention of site selection. I quickly offered to handle the site seeing part of the project for them as soon as they had the $50G, pointing out my extensive qualifications and contacts in the communications community everywhere in the world. I don't think they heard me. Perhaps they already had some volunteers with their eyes on the $50G.

Far's I could see, the local business community was much more interested in the fruit and cheese plate than donating to this phantom project. But hey, you never know. The last two times I volunteered to go on expense-paid around-the-world trips I won out, so my foot seems to automatically extend at the slightest hint, looking for any running boards to climb on . . . so to speak. You remember running boards, right? You've seen 'em in the old movies, with gangsters hanging on, shooting.

Yes, it would be nice if Keene could attract some of the coming high-tech manufacturing that the communications and information technology industries will make possible. And if Keene State could help provide high-tech career workers, the chances are good that the area would benefit from this by attracting such businesses. They'd better start working out some methods for helping to finance these startups though, otherwise they and the workers will go where the money is.

Of course adding some technical courses to a state college isn't going to do squat. They've got to train teachers and get the New Hampshire K-12 schools to change. Big change. You don't become much of an engineer, technician or scientist with a couple years of college. You need to get started when you are in the 5th grade if you're going to go anywhere and do anything. That's why I keep nudging you to visit your local schools and fire up the 5th graders. Get 'em excited. Get these noisy, bothersome little nuisances to your ham club and poison their dirty little minds with our fascinating hobby. It happened to me, and like all such addicts, I want to spread the misery.

Swett promised that if we organized a national conference he'd try to get Clinton to come. And if he failed with that, to get him for us via TV. Failing that, he'd push for some other high official to come or at least address us via closed-circuit TV. Let's see, who's the new janitor at the White House?

I still haven't a clue as to what the site investigation team was expecting to find out on their $50G trip. I did miss out on a great opportunity. I wish I was faster on my feet on these things. I should have jumped up and started a collection plate around, pledging $10 to get the fund going. My life is full of missed opportunities like that.

You Read It Here First!

Some time back, when I wrote about homosexuals in amateur radio, I got several heated letters from Bible-thumping religious fanatics. They were incensed that I'd suggested that there was a genetic element to this deviation from the norm. By the way, homosexuality is just one of a wide variety of deviations which cause people trouble. Being too tall, too short, too stupid, too intelligent, too ugly, too pretty, too skinny, too fat, too buxom, too flat-chested, and so on . . . all the "toos" . . . are deviations that we don't

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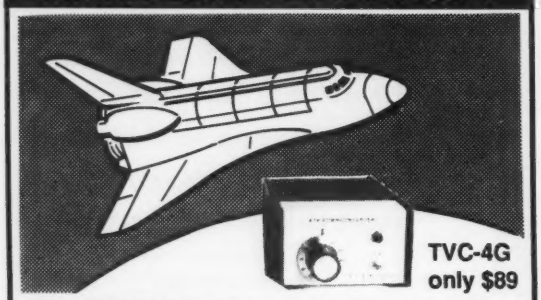

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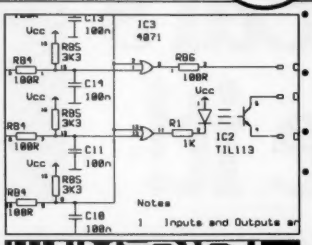

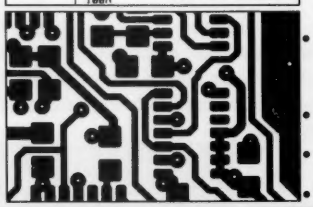

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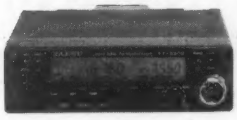

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take with grace and understanding. We also make fun of deviant ears, noses, hairlines, and so on. Ask Perot.

The overwrought were upset at gays (aka homos, queers, fags) advertising in ham magazines, seeking members for their gay ham society, Lambda. I pointed out that science had shown that there seems to be a genetic predisposition for gayness and that my own research in the field had shown that the gays I worked with had had these feelings from their earliest memories. In my work I've been able to trace back virtually all psychological abnormalities to specific triggers during painful childhood and even prenatal experiences. A few were resolved by taking a tolerant approach to past life "memories." But gayness, in the cases I worked with, didn't fit into the normal psychological trigger pattern. It seemed to have a genetic basis. It's therefore interesting that recent scientific genetic research has confirmed this.

Now, I'm not by any means saying that *all* gay activity is genetically manifested. If you're at all read in history you know that in societies where homosexuality was condoned, it was widely practiced, so obviously there's a strong psychological component involved. So, though we may abhor the practice of homosexuality as a cultural bias today, we can't help being sympathetic to those who are genetically driven, despite society's censure.

It's the male homosexual lifestyle that attracts the most outrage and the least sympathy when AIDs strikes. Kinsey's research showed that while the average lesbian has less than 10 sexual partners, the typical male homosexual in America has had over 500! We know that male sexuality is much more destructive than female when not controlled. Men rape, not women. Only men engage in fetishes. Only men are sexually sadistic. Men far more often wander from partner to partner.

It was Judaism that changed things. Judaism, and its spin-off, Christianity. Up until then homosexuality was accepted. It was exalted in Greece, commonly accepted in Rome, and is still popular in the Arab world. It was prevalent among the pre-Columbian Americans, the Celts, Gauls, pre-Norman English, Chinese, Japanese, and Thai (see *The Public Interest* #112). So here in America we've been inculcated with the Jewish/Christian beliefs. I'm not sure that even recognizing that we've been brainwashed by our religious training will allow many of us to be tolerant.

So we hams are outraged when we learn that some of our outstanding hams have been convicted of molesting young boys. Indeed, one of our best-known repeater pioneers was convicted of this, as was one of our major ham convention luminaries. And so we naturally react with suspicion when we see ads aimed at attracting youngsters to a homosexual ham group.

And now we're learning that Catholic priests have been having sex with and even raping altar boys without any significant reaction by the church when it's reported . . . other than to transfer the offenders to a new area . . . much to the frustration of the families involved.

The militant feminists haven't helped things. Men and women have some powerful basic differences, which many feminists try to deny. For instance, men, when they are born, are much less amenable to socialization than women. They're four to six weeks behind neurologically, and need more care. They're more likely to be hyperactive, autistic, color-blind, left-handed, and prone to learning disorders. They tend to be much more affected by the mother's prenatal use of drugs such as tobacco and alcohol. In every society men play more roughly, drive more recklessly, and fight more than women, and these traits appear early in life. Archæology tells us that in prehistory about 25% of all males died in fights . . . about the same as anthropologists have found in recent years with primitive tribes.

Men, as they grow up, are much more likely than women to cause trouble in school, be alcoholics or drug addicts, and commit crimes. And by the way, there is no historical evidence to show that there's ever been a society ruled by women.

Just as the militant feminists are prone to name-calling, so are many of the militant homosexuals. They use the term "homophobic," yet no such phobia exists in any medical list of phobias. This is demagoguery and makes as much sense as shouting back that they're women-phobic. It's McCarthyism repeating itself.

Judaism was a breakthrough religion in that it focused on the family. Its prohibition of non-marital sex changed the world. This was carried on later by Christianity. Both religions condemn homosexuality, incest, and bestiality.

If we look to Mother Nature as a guide, where one of her basic rules is to be fruitful, homosexuality fails. So I have no personal problem with consenting adults enjoying what pleases them as long as they don't mess with unconsulting adults or children.

Having served for four years in the Navy, I had a good laugh over the spot Clinton got himself into by catering to the militant gays and promising them out-of-the-closet military careers. Clinton, not having served in our military, didn't know what he was getting into. And sexuality being what it is, as anyone who's read much about our prisons knows, announced homosexuals in the military could easily create trouble.

I went to sea for five war patrols during WWII with a crew of about 80 other sailors. We were all men and good buddies. We still get together every year to remember the good and bad times we had 50 years ago. But if we'd had some gays sleeping right next to us in those crowded quarters, it could have created tremendous tension. And probably fights . . . something we sure didn't need on a submarine.

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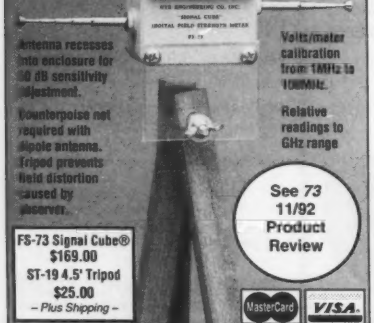

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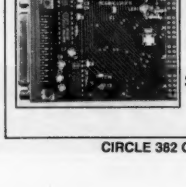

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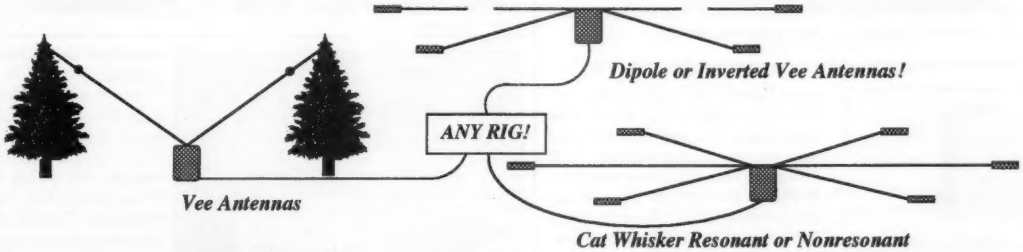

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NEW PRODUCTS

Compiled by Charles Warrington WA1RZW

AEA

AEA has recently introduced the IT-1 AutoTuner, an accessory for their popular IsoLoop 10-30HF antenna. The IsoLoop is a high-quality, high-efficiency antenna with a mere 35-inch diameter.

The IT-1 AutoTuner will automatically tune an IsoLoop in just a few seconds. When more control is necessary, there is a thumbwheel for manual tuning and fine adjustments.

The IT-1 AutoTuner features a 12-button keypad with an audible beep to announce completion of tuning. It has eight programmable memories as well as a 10-segment LED bar that monitors the tuning process and indicates the selected memory number. Memory backup and a built-in serial interface are also included.

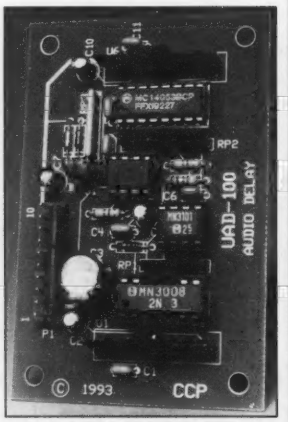
The suggested retail price is $279 at your local amateur radio dealer. The unit comes with a one-year warranty. For more information contact: *Advanced Electronic Applications, P.O. Box C2160, Lynnwood WA 98036; (206) 774-5554, Fax: (206) 775-2340.* Or circle Reader Service No. 201.

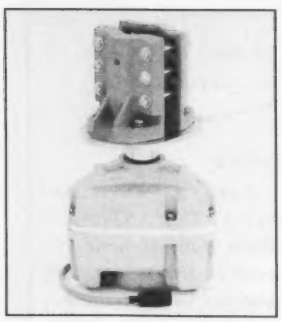
CREATIVE CONTROL PRODUCTS

Here is a brand-new, low-cost, easy-to-interface repeater audio interface circuit from Creative Control Products. The UAD-100 Universal Audio Delay board features complete DTMF tone mute, and squelch tail elimination.

This board is inserted in the repeater receiver audio path before any audio switching circuitry. It then delays the audio before it arrives in the repeater transmitter, resulting in a pleasant-sounding transmitter drop. No more crashing, clunking, or snapping. Finally, a great sounding system, made easy.

The UAD-100 comes fully-assembled and tested, with a detailed application manual and one-year warranty, for $99. For more information, please contact: *Creative Control Products, 3185 Bunting Avenue, Grand Junction CO 81504; (303) 434-9405.* Or circle Reader Service No. 203.





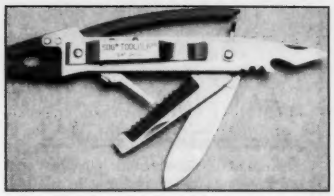
M²

The new Orion OR-2800 Antenna Rotator from M² is conservatively engineered for long life and reliability while turning large antennas or systems of up to 35 square feet of wind area. New features include a strong, ductile iron mast clamp, large drive plate, improved drive shaft, and prop pitch style torque plate. The powerful motor and large heat-treated gears provide 2,500 inch pounds of torque. Vertical load capacity is 1,800 pounds. The unit can accommodate up to 3-inch o.d. masts and fits nicely with most popular towers and rotator plates.

The RC2800 Control Box provides the finishing touch. It has digital readout, variable speed control, slow start, reverse delay, and memory protection. The optional RC2800P adds programmability, two-rotator control, AZ readout, and other features.

The OR-2800 Rotator is manufacturered in the US by M² and carries a one-year warranty. The suggested retail price is $1099. For more information, contact: *M², 7560 N. Del Mar Ave., Fresno CA 93711; (209) 432-8873, Fax: (209) 432-3059.* Or circle Reader Service No. 205.

JENSEN TOOLS



Wouldn't it be nice to always have an entire tool chest right at your fingertips? Well, now you can have the next best thing—the new SOG ToolClip from Jensen Tools, Inc. This unique pocket tool combines 13 functions in one neat little package.

The SOG ToolClip features a full-jaw pliers, a combination gripper and wire cutter that can easily handle chain-link fencing, a razor-sharp spear-point blade, a utility blade, a serrated-edge blade, a pair of screwdrivers, a pair of wire strippers, a file, a pry bar, and a bottle opener, all in a sturdy housing complete with a belt clip. The pliers, wire cutters, and grippers can all be accessed with only one hand—a mighty helpful feature when climbing towers or holding materials.

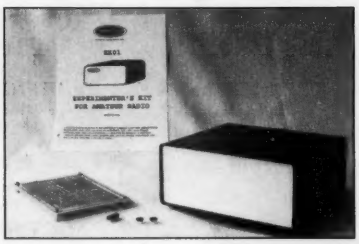
The SOG ToolClip is constructed of durable stain-resistant steel and is guaranteed for life against defective workmanship and materials. The price is $59.95. For more information, or to receive a free catalog, contact: *Jensen Tools Inc., 7815 S. 46th St., Phoenix AZ 85044; (602) 968-6231.* Or circle Reader Service No. 202.

TRIMBLE NAVIGATION

You'll never get lost again with Trimble Navigation's satellite-based handheld GPS (Global Positioning System) Scout. It is perfect for amateur radio applications, search and rescue, backpacking, and off-road driving. The low-cost Scout GPS receives positioning data from 24 orbiting satellites to pinpoint your location around the clock, anywhere on earth, in any weather.

The GPS was designed and developed by the US Department of Defense to benefit both military and civilian users. Hams will enjoy the Scout GPS, which is based on the Maidenhead Grid Locator, displaying location information in language familiar to many amateurs. Scout uses the ARRL's grid square locator technique.

The Scout GPS kit contains four AA batteries, a user's manual, cordura carrying case, lanyard, and the Trimble Atlas. The whole package retails for $795 and an external antenna kit accessory is available for $150. For more information contact: *Trimble Navigation, 645 North Mary Avenue, P.O. Box 3642, Sunnyvale CA 94088-3642; (408) 481-8000, Fax: (408) 730-2997.* Or circle Reader Service No. 204.



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Jade Products' Fun-Kit EK01 Experimenter Board provides a unique solution for the amateur radio builder. With this prototyping parts kit the novice and the seasoned experimenter can design numerous circuits. The kit contains a general purpose PC board engineered specifically for RF and other radio-type projects. Also included are three versatile ICs used in RF design, mounting hardware, a handsome 7.5" x 8.5" x 3.5" enclosure, complete assembly instructions, and building suggestions.

The 5" x 7" PC board consists of four general areas: a digital device area for active filters, keyers, logic, battery chargers, line drivers, etc.; an RF power area with 0.20" solder pads to mount discreet devices such as capacitors and inductors—ideal for QRP transmitter designs; a transistor device area with three footprints for circuits such as VFOs, buffers, and crystal oscillators; and a dedicated circuits area featuring the NE602AN mixer/oscillator chip, an audio amplifier circuit using the LM386, and etch support for the Motorola MC1496. The enclosure is finished in pleasing neutral colors.

The price is $44.95. For further information, please contact: *Jade Products, Inc., P.O. Box 368, E. Hampstead NH 03826; (603) 329-6995.* Or circle Reader Service No. 206.

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Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

Send your ads and payment to the Barter 'n' Buy, Judy Walker, 70 Rt. 202N, Peterborough NH 03458 and get set for the phone calls.

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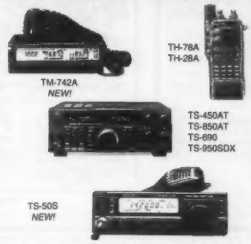

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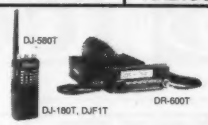

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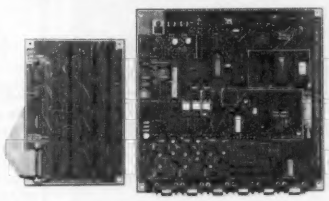

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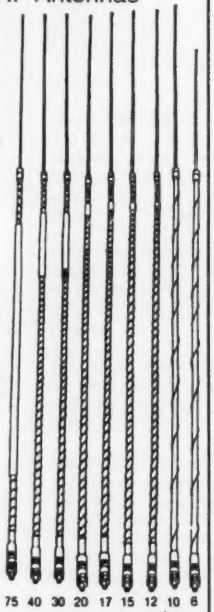

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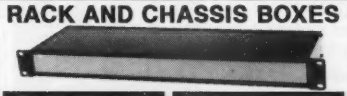

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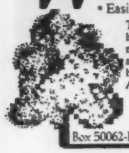

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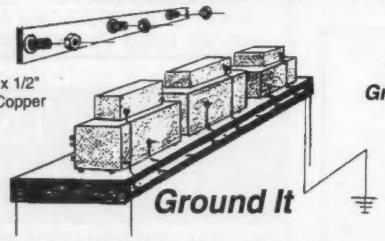

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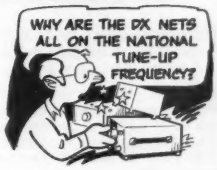

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RANDOM OUTPUT

David Cassidy N1GPH

ARRL At It Again

Once again, I am forced to inform you of the sneaky goings on down in Newington. Like so many of their actions in the past, actions made on *your behalf*, you won't be reading about this in *QST*. I sure do wish I didn't have to keep doing this, but I feel that it is important the amateur radio community gets an accurate picture of the organization that supposedly represents all of us.

As you may remember, the FCC now has authorization to allow a private organization to administrate the issuing of special club and military callsigns. The rules state that any organization seeking the right to issue these special callsigns must (among other requirements) be tax-exempt under the IRS educational designation and exist for the purpose of furthering the Amateur Radio Service, demonstrate that its membership constitutes at least 1% of FCC-licensed operators (that would be about 6,140, as of this writing), and process applications without regard to race, sex, religion, national origin or membership status in any particular organization. Pretty simple, right? Not according to the ARRL.

The ARRL (surprise, surprise) thinks they should be the *only* organization allowed to issue these callsigns. They tried to get the law written in such a way that would exclude all other organizations, but their sneaky tactics were discovered in the nick of time by Fred Maia W5YI. Fred got the wording changed, much to the League's chagrin. Oh, you never read about that in *QST*? Must have been a computer error, because I'm sure the ARRL would have made every endeavor to inform their members of such an important issue.

The FCC received applications to issue club callsigns from five organizations: the ARRL, W5YI-VEC (whose tax-exempt status has been accepted by the IRS, but a number has not yet been issued), the Quarter Century Wireless Association (remember, it was the QCWA who ticked off the League by coming up with a simple, elegant and workable no-code proposal, which effectively killed the ARRL's convoluted and complex plan), the Southeastern Repeater Association and the National Amateur Radio Organization. On August 6 of this year the ARRL also filed a 24-page "Opposition to Requests for Designation of Certain Entities as Club and Military Recreation Station Call Sign Administrators." In this document, the ARRL objects to all four competing organizations' applications.

The League doesn't like W5YI-VEC because their tax-exempt status has not yet been issued. The League also objects to the fact that W5YI-VEC changed its corporate status from two divisions of the same company to two separate corporate entities, one of which is to be tax-exempt. I'm surprised that the ARRL used this flimsy objection, since it is similar to what they had to do, as publishers of license testing literature, when they wanted to start the ARRL-VEC (another time in the recent past when the League tried and failed to block all other organizations from participation).

The ARRL doesn't like QCWA because it is a social club and, according to Newington, is organized for pleasure and recreation rather than education. The League also mentioned that it doubted the QCWA could handle the assignment of club callsigns with a single employee.

The Southeastern Repeater Association is being blackballed by the boys in Connecticut because they filed their application by fax at a time when the FCC offices were closed for the evening. The League also states that a facsimile transmission does not constitute a legal signature, and that the SRA doesn't have the required 1% of all licensed amateurs as members.

The ARRL questions The National Amateur Radio Association's claimed membership of over 7,000 and its function as anything more than a very limited magazine publisher, subscription to which constitutes membership.

This move by the ARRL to block any other group from administrating any part of amateur radio is not new. Time and time again, the League has spent *your* dollars to fight *their own* personal battles and agenda. Only when the League is successful do the members hear about how the all-knowing and benevolent ARRL has wrought something wonderful. When the League fails at their power grabs (as in the case of the VEC program and the authorization bill that started this callsign administration program), the members are never informed.

I have been accused of being a League-basher. This is simply not the case. Most of the people who I come in contact with who work for the League are great folks. Really! The problem is the folks in charge. Remember, the fish always stinks from the head down. I'm sure that all the folks at the upper echelons of the ARRL are nice, law-abiding people who are kind to small children and puppies, say "please" and "thank you" and always remember their mothers on Mother's Day. I do not question the personal qualities of any individual. The organization as a whole has lost its way. They have stopped looking out for the interests of amateur radio and are now only concerned with the interests of the ARRL. Unfortunately, they long ago convinced themselves that the two are the same thing.

The ARRL must be accountable to the very people it claims to serve. I don't think any criticism I've ever leveled at the League has been ungrounded. I've received a lot of mail about my opinion of the ARRL, but never once has anyone presented evidence to show that I was wrong. My deepest hope is that, with the passing of the old guard, a new generation of hams will rise forth to reclaim a once-proud heritage.

Until that day arrives, a simple question remains: Since the ARRL claims to be "of, by and for the radio amateur," how come so much of their time and your money is spent on fighting for control of amateur radio instead of solving the problems of amateur radio? 73

Number 28 on your Feedback card

PROPAGATION

Jim Gray W1XU

Jim Gray W1XU
210 Chateau Circle
Payson AZ 85541

In general, the month of October is expected to provide GOOD propagation. The chart shows POOR days on the 14th, and from the 17th through the 20th. The remainder of the month will provide days trending around FAIR in both directions. October exhibits the usual fall conditions; that is, on the 10, 12, 15, and 17 meter bands, you should find some excellent conditions for worldwide DX on the days of the month marked GOOD. In particular, the higher the band, the more frequent north-south path openings; and the lower the band of this group, the more frequently you will find east-west openings. The higher bands will peak in the afternoon, following the sun westward from your location. Twenty meters will be your best DX band, with dawn to dark openings to almost every area of the globe.

Signals won't be quite as strong as they were earlier, in the peak of Cycle 22, but they will be very acceptable. On 10, 12, and 17 meters, you will find occasional F^2-layer openings and sporadic E-layer openings where signals can peak for as long as a half hour and then suddenly disappear as the electron "cloud" drifts out of the skip range. The lower HF bands of 30 and 40 meters will exhibit some slightly different behavior. They will be your evening and nighttime bands, with DX to your *east* toward Europe peaking around midnight, and to the *west* toward Asia and the Pacific in the early morning hours around local dawn.

Thirty meters will close earlier for within-U.S. short-skip, and you should be able to work DX at local dusk. High absorption during the daytime in summer always limits skip contacts, but this month the absorption will be less and good daytime skip signals should occur on the GOOD days, with high levels. As always, thunderstorm activity will cause QRN, but that problem is expected to be much less in evidence now as we move toward winter conditions.

On 80 meters, you will find some good DX from evening to dawn, very often to the Southern Hemisphere, and good daytime short skip in the absence of thunderstorm activity. For you top-banders, 160 meters will be best for the hours of the evening, peaking for DX around midnight and again at dawn. Also, nighttime short skip openings will be excellent on the GOOD—and even some FAIR—nights, out to about 2,000 miles or so.

As we've said before, keep your eyes and ears open on those days marked POOR, as other manifestations of a disturbed magnetic field may occur, such as hurricane-force winds, volcanic eruptions, "freak" weather, and even 'quakes. Obviously, they won't always occur, and even when they do, it is difficult to determine *where* they will occur. Pay particular attention to 19th and 25th, and to a day on either side of these dates. Let me know how the forecasts work for you. W1XU 73

EASTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA	-	20	-	-	20	20	-	-	-	-	-	-
AGENTINA	20	-	-	-	-	-	-	-	-	10	10/15	15
AUSTRALIA	15	-	-	-	-	-	20	20	-	-	-	15
CANAL ZONE	15	20	20	40	40	-	20	20	10	10	10/15	10/
ENGLAND	-	-	-	-	-	-	-	15	15	15	-	-
HAWAII	15	20	-	-	40	40	20	20	-	-	-	15
INDIA	-	-	-	-	-	-	20	20	-	-	-	-
JAPAN	-	20	-	-	20	20	-	-	-	-	-	-
MEXICO	15	20	20	40	40	-	20	20	10	10	10/15	10/
PHILIPPINES	-	-	-	-	-	-	20	20	-	-	-	-
PUERTO RICO	15	20	20	40	40	-	20	20	10	10	10/15	10/
SOUTH AFRICA	-	-	-	-	-	-	-	-	-	15	15	20
U.S.S.R.	-	-	-	-	-	-	-	-	20	20	20	-
WESTCOAST	20	80/40	80/40	80/40	-	-	-	-	15	20/15	20/15	20/

CENTRAL UNITED STATES TO:

ALASKA	15	20	-	-	-	-	-	15	-	-	-	1
ARGENTINA	15	20	20	40	-	-	-	-	-	-	10/15	1
AUSTRALIA	15/20	20	20	-	-	40*	40*	-	-	-	-	15/
CANAL ZONE	20	20	40	-	-	-	-	15	15	15	10	1
ENGLAND	-	40*	40*	-	-	-	-	15	15	15	20	-
HAWAII	15	20	20	20/40	40	40	-	20	-	-	-	1
INDIA	-	-	-	-	-	-	-	20	-	-	-	-
JAPAN	15	20	-	-	-	-	-	15	-	-	-	1
MEXICO	20	20	40	-	-	-	-	15	15	15	10	1
PHILIPPINES	15	-	-	-	-	-	-	20	-	-	-	-
PUERTO RICO	20	20	40	-	-	-	-	15	15	15	10	1
SOUTH AFRICA	-	-	-	-	-	-	-	-	-	15	15/20	2
U.S.S.R.	-	-	-	-	-	-	-	20	15	20	-	-

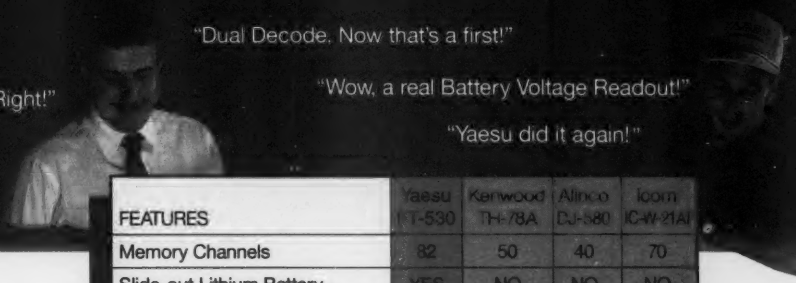
WESTERN UNITED STATES TO:

ALASKA	15	15	20	20	20/40	-	-	-	-	-	-	15/
ARGENTINA	15	20	40*	-	-	-	-	-	-	-	10/15	1
AUSTRALIA	15	20	20	-	-	40	-	-	20	-	-	1
CANAL ZONE	20	20	40/20	40/20	-	-	-	20	15	15	15	1
ENGLAND	-	-	-	-	-	-	-	-	-	20/15	20	2
HAWAII	20/15	20/15	40	40	40	40	-	-	20	-	20/15	20/
INDIA	15	15	15	-	-	-	-	20	20	-	-	-
JAPAN	15	15	20	20	20/40	-	-	-	-	-	-	10/
MEXICO	20	20	40/20	40/20	-	-	-	20	15	15	15	1
PHILIPPINES	15	15	20	20	40	40	-	-	15/20	20	-	1
PUERTO RICO	20	20	40/20	40/20	-	-	-	20	15	15	15	1
SOUTH AFRICA	20	-	-	-	-	-	-	-	-	15	-	-
U.S.S.R.	-	-	-	-	-	-	-	20	20	-	-	-
EAST COAST	20	80/40	80/40	80/40	-	-	-	-	15	20/15	20/15	20/

*Bo-Meters possible on good days only

OCTOBER 1993

SUN	MON	TUE	WED	THU	FRI	SAT
					1 G	2 G
3 G	4 G	5 G-F	6 F	7 F	8 F	9 F
10 F-G	11 G	12 G-F	13 F-P	14 P	15 P-F	16 F-P
17 P	18 P	19 P	20 P	21 P-F	22 F	23 F
24 F-P 30 G	25 P	26 P-F	27 F	28 F-G	29 G	30 G



FEATURES	Yaesu FT-530	Kenwood TH-78A	Alinco DJ-580	Icom IC-W21AT
Memory Channels	82	50	40	70
Slide-out Lithium Battery	YES	NO	NO	NO
Dual CTCSS Decoder	YES	NO	NO	YES
Battery Voltage Readout	YES	NO	NO	NO
Automatic CTCSS Tone Search	YES	NO	NO	NO
Transmit Battery Saver (Repeater & Simplex Operation)	YES	NO	NO	NO
Built-In Vox	YES	NO	NO	NO
One Touch Reverse Button	YES	NO	NO	NO
Dual In-Band Receive (V+V, U+U)	YES	YES	NO	YES
Programmable External Speaker Audio	YES	NO	NO	YES
Optional Digital Display Mic with "S" Meter	YES	NO	NO	NO
AM Aircraft Receive	YES	YES	YES	YES

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- **Frequency Coverage:**
  2-Meter 130-174 MHz RX
  144-148 MHz TX
  70 cm 430-450 MHz RX/TX
- 4 TX Power levels:
  w/FNB-25: 2.0, 1.5, 1.0, 0.5W
  w/FNB-27: 5.0, 3.0, 1.5, 0.5W
- DTMF Paging and Coded Squelch
- AOT – Auto On-Timer with built-in clock and alarm functions
- IBS – Intelligent Band Select (provides automatic TX band select on scan stop)
- Backlit keypad and display with time delay
- Built-in cross-band repeat function
- APO – Automatic Power Off
- 5 Watts output w/ FNB-27 battery or 12 VDC
- 2 VFO's for each band
- **Accessories:**
  NC-42 1-Hour Desk Charger
  FNB-25 600 mAh Battery (2 watt)
  FNB-26 1000 mAh Battery (2 watt)
  FNB-27 600 mAh Battery (5 watt)
  FBA-12 6 AA Cell Holder
  CSC-56 Vinyl Case w/ FNB-25
  CSC-58 Vinyl Case w/ FNB-26/27
  E-DC-5B 12 VDC Adaptor
  YH-2 Headset for VOX
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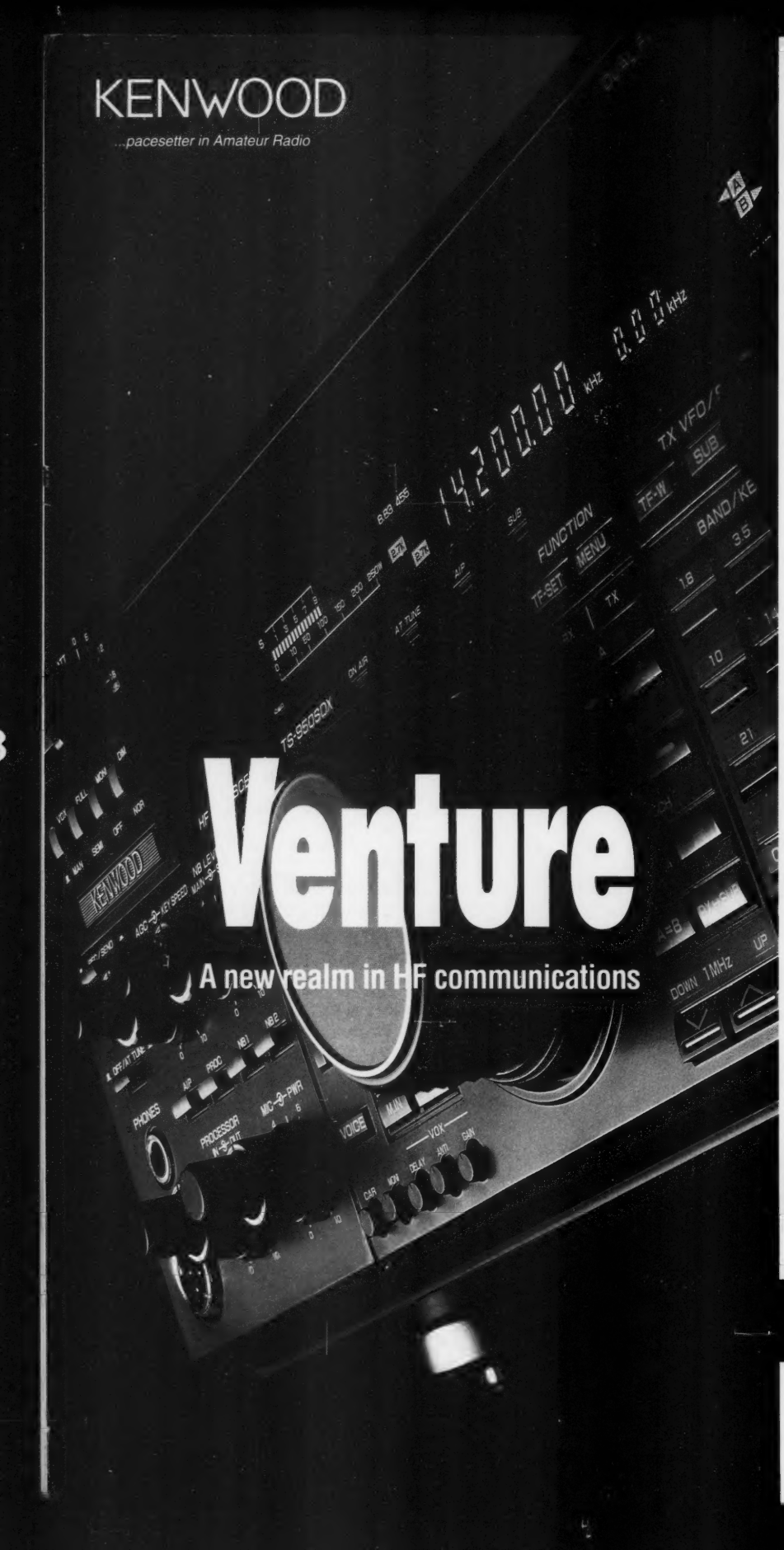

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